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The pragmatics of critiquing

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Defence R&D Canada – Valcartier
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Abstract

As part of the Technology Investment Fund Project entitled *CoA Critiquing System for the Improvement of the Military Estimate Process*, this report aims at providing insight into the critiquing problem from a human factors perspective.

Drawing on studies from the fields of philosophy (logic and argumentation), linguistics, psychology and sociology, critiquing is studied in this document along three dimensions: (i) as an argument; (ii) as an interpersonal and social practice; and (iii) as a mental process. As an argument, critiquing is analyzed as both a premise-conclusion structure and a dialectic exchange. Critiquing and critical discussion are studied with respect to principles and models of argument and argumentation. Next, critiquing as an exchange between intentional individuals is viewed from the perspective of the critic and the receiver. Attitudes that can affect the perception and the effectiveness of criticism are discussed in the light of psychological and socio-cultural factors. Finally, under the topic of critical scrutiny, the dynamics of critiquing as a mental process are rendered explicit through the description of the concept of critical thinking and its use in decision-making contexts where it targets reasoning biases. A description of critiquing systems illustrates the critical mechanism as applied to the human-computer setting.

Résumé

S'inscrivant dans le cadre du projet de Fonds d'investissement technologique qui a pour titre '*CoA Critiquing System for the Improvement of the Military Estimate Process*', ce rapport a pour objectif d'approcher la problématique de la critique sous l'angle des sciences humaines.

Basé sur des études provenant des domaines de la philosophie (logique et argumentation), de la linguistique, de la psychologie et de la sociologie, ce document propose une étude de la critique selon trois axes : la critique comme : (i) argument; (ii) pratique interpersonnelle et sociale; et (iii) processus mental. En tant qu'argument, la critique est analysée aussi bien comme une structure de premisses-conclusion qu'un échange dialectique. La critique et la discussion critique sont étudiées relativement aux principes et modèles d'argument et d'argumentation. Ensuite, la critique comme échange entre individus intentionnels est analysée du point de vue du critique et du critiqué. Les attitudes qui peuvent affecter la perception et l'efficacité de la critique sont décrites à la lumière de facteurs psychologiques et socioculturels. Enfin, sous le thème de la pensée critique, la dynamique de la critique comme processus mental est rendue explicite par la description du concept de raisonnement critique et son usage dans les situations de prises de décisions où il vise les erreurs de jugement. Une description des systèmes de critique illustre les mécanismes de la critique tel qu'appliqués à l'environnement personne-machine.

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Executive summary

This report is part of the Technology Investment Fund Project entitled *CoA Critiquing System for the Improvement of the Military Estimate Process*, the purpose of which is to elaborate a CoA critiquing system combining human factor and technology perspectives for Command & Control applications and perform proof-of-concept experiments.

The present study aims at providing insight into the critiquing problem from a human factors perspective. It has involved interdisciplinary research in the fields of logic and philosophy, linguistics, psychology and sociology. It presents a comprehensive overview of argument analysis and argumentation that serves as a theoretical framework within which we attempt to define the concept of critiquing. The contribution of the report to the field of argument studies is to specify the status of critiquing as an argument, determine its properties with regard to the more general concept of argument, propose a model of critiquing, and identify research avenues that can contribute to the characterization of critiquing.

Critiquing is analyzed here as an argument structure, but also as an interpersonal and social practice and a mental process. This is reflected in the organization of the document, which is as follows:

In Chapter 2, we argue that a critique is an argument, and as such must be studied as a logical structure on the one hand, and a social and discursive phenomenon on the other. Argument models allow us to first characterize the purpose, the object and the scope of a critique, propose a model of the critiquing process, and distinguish a critique from close concepts such as evaluation and criticism. Next, we discuss the dialectic process involved in argumentative discourse in general, and in critical discussions in particular. Throughout this chapter, we outline some of the general principles of informal logic, argumentation, and communication theory.

In Chapters 3 and 4, we look at the individuals involved in a critical dialogue. The action of critiquing is first viewed from the perspective of the critic and his motivations. Critiquing is thus analyzed as a complex speech act where the intentions of the critic partly define the nature and dynamics of this type of dialogical exchange. Then, we look at critiquing under the angle of perception, discussing the effects of constructive and destructive criticisms in the light of psychological and socio-cultural factors. Contextual elements that can enhance criticism effectiveness and perception are also described.

Finally, in Chapter 5, we discuss the use of critiquing as a mental process whose purpose is to challenge and possibly alter an individual’s beliefs and goals. We define the concept of critical thinking and its use in the context of decision-making. Under this topic, we mainly expose the reasoning biases that can be submitted to critical scrutiny and the reasons for which experts are more concerned by such biases. We also

explain the concept and functioning of critiquing systems in order to illustrate the critical mechanism as applied to the human-computer setting.

For the application of the critiquing practice to military decision-aid systems, three points stand out. First, to ensure that decisions, rationales and critiques are not ephemeral, they must be recorded in a compendium for any operational decision-aid system (DAS). This compendium provides the basis for after-action analysis to understand the decisions that were made and potentially improve upon the critiquing provided by the DAS. Second, the transformation of key insights obtained from the analysis of the compendium into a readily-usable form such as a lessons learned knowledge warehouse (LLKW) is invaluable. The LLKW has the potential to not just provide aid for a specific future decision, but to result in improvements in the decision-making process in general. The third point regards the trust factor. Any DAS must help and not hinder the decision-maker. Building up trust in a DAS' capabilities is an ongoing process, and any DAS critique based on faulty rationales will result in a loss of credibility for the DAS. It is more difficult for a DAS to regain trust after a failure than to develop an initial trust.

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Sommaire

Ce rapport s'inscrit dans le cadre du projet de Fonds d'investissement technologique '*CoA Critiquing System for the Improvement of the Military Estimate Process*', dont l'objectif est de développer un système de critique de suites d'actions intégrant des perspectives en facteur humain et en technologie pour des applications en commandement et contrôle, et de mener des expériences de démonstration de concept.

La présente étude a pour but d'approcher la problématique de la critique sous l'angle des sciences humaines. Elle se base sur une recherche interdisciplinaire dans les domaines de la logique et de la philosophie, de la linguistique, de la psychologie et de la sociologie. Elle présente une revue exhaustive de l'analyse de l'argument et de l'argumentation qui nous sert de cadre théorique pour tenter de définir le concept de la critique. La contribution du rapport au domaine de l'argumentation est de circonscrire le statut de la critique en tant qu'argument, déterminer ses propriétés par rapport au concept plus général d'argument, proposer un modèle de la critique et identifier les avenues de recherche qui peuvent contribuer à la caractérisation de la critique.

Nous analysons la critique comme une structure argumentative, mais aussi une pratique interpersonnelle et sociale, ainsi qu'un processus mental. Ces trois axes se reflètent dans l'organisation du document qui est la suivante :

Au chapitre 2, nous soutenons que la critique est un argument et doit, en tant que tel, être étudiée, d'une part comme structure logique et, d'autre part, comme phénomène socio-discursif. Les modèles d'argument nous permettent de caractériser l'objectif, l'objet et la portée de la critique, de proposer un modèle de la critique et de distinguer la critique d'autres concepts proches tels que l'évaluation et la critique subjective (*criticism*). Nous nous intéressons ensuite au processus dialectique mis en œuvre dans le discours argumentatif en général et les discussions critiques en particulier. Tout au long de ce chapitre, nous esquissons quelques principes généraux de la logique informelle, de l'argumentation et de la théorie de la communication.

Aux chapitres 3 et 4, nous parlons des actants du dialogue critique. L'action de critiquer est d'abord considérée du point de vue du critique et de ses motivations. La critique est alors analysée comme un acte de langage complexe où les intentions du critique définissent partiellement la nature et la dynamique de ce type d'échange dialogique. Nous regardons ensuite la critique sous l'angle de la perception, examinant les effets de la critique constructive et destructive à la lumière de facteurs psychologiques et socioculturels. Les éléments contextuels qui peuvent améliorer l'efficacité et la perception de la critique sont également décrits.

Enfin, au chapitre 5, nous abordons l'emploi de la critique comme un processus mental dont l'objectif est de défier et éventuellement de changer les croyances et les buts d'un individu. Nous définissons le concept de raisonnement critique et son usage dans le cadre de la prise de décision. Sous cette rubrique, nous exposons essentiellement les erreurs de jugement qui peuvent être soumises à un examen critique et les raisons pour

lesquelles les experts sont plus concernés par ce type d'erreurs. Nous expliquons également le concept et le fonctionnement des systèmes de critique afin d'illustrer le mécanisme de la critique tel qu'appliqué à l'environnement personne-machine.

L'application de la critique aux systèmes d'aide à la décision (SAD) militaires fait ressortir trois points. Premièrement, il faut s'assurer que les décisions, les raisonnements et les critiques ne sont pas éphémères et pourront être conservés pour des exploitations futures dans une base de connaissances. Celle-ci offrirait une structure pour l'analyse post-opération permettant de comprendre les décisions prises et d'améliorer les critiques formulées par le SAD. Ensuite, il est fortement recommandé de rendre les connaissances clés ainsi obtenues accessibles par des moyens comme un dépôt des leçons retenues. Celui-ci aurait le potentiel, non seulement d'assister une décision future spécifique, mais d'améliorer le processus de prise de décision en général. Enfin, le troisième point concerne le facteur de la confiance. Tout SAD doit aider et non entraver le travail du décideur. Gagner la confiance de l'humain en les capacités d'un SAD n'est jamais acquis et toute critique formulée par un tel système qui serait basée sur un raisonnement erroné résulterait en une perte de crédibilité pour le système. Il est plus difficile pour un SAD de regagner la confiance de son utilisateur après une défaillance que de l'obtenir initialement.

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1. Introduction

This report is part of the Technology Investment Fund Project entitled *CoA Critiquing System for the Improvement of the Military Estimate Process*, the purpose of which is to elaborate a CoA critiquing system combining human factor and technology perspectives for Command & Control applications and perform proof-of-concept experiments.

The present study aims at providing insight into the critiquing problem from a human factors perspective. It has involved interdisciplinary research in the fields of logic and philosophy, linguistics, psychology and sociology. It presents a comprehensive overview of argument analysis and argumentation that serves as a theoretical framework within which we attempt to define the concept of critiquing. The contribution of the report to the field of argument studies is to specify the status of critiquing as an argument, determine its properties with regard to the more general concept of argument, propose a model of critiquing, and identify research avenues that can contribute to the characterization of critiquing.

Basically, we analyze critiquing as an argument structure, an interpersonal and social practice, and a mental process. The first dimension pertains to the content and structure of the critique as a type of argument. The second aspect refers to critiquing as an act of verbal communication, whose minimal setting in the case of argumentation comprises [1]:

- The opinion or position of the arguer which may be an idea or a plan;
- The arguer who is the channel that carries the message to the user;
- The argument which is the structured way in which the opinion is presented to the user;
- The receiver who is the target or audience for the argument;
- The context in which the argument is made.

This second dimension covers several topics such as argumentation, critical discussions as a type of argumentative exchange, the function of a critiquing dialogue and the purpose of the participants engaged in it, the impact of the critique on the receiver, the context of reception, as well as the relationship between the participants. These topics are discussed in sections 2.2, 3 and 4.

Finally, the last dimension refers to critical scrutiny as a mental process that can provoke second thought on well-established values and opinions. This dimension is the most relevant to decision-making and thus the military estimate process.

The study of these three dimensions is reflected in the organization of the document as follows:

In Section 2, we argue that a critique is an argument, and as such must be studied as a logical structure on the one hand, and a social and discursive phenomenon on the other. Argument models allow us to first characterize the purpose, the object and the scope of a critique, propose a model of critiquing and distinguish a critique from close concepts such as evaluation and criticism. Next, we discuss the dialectic process involved in argumentative exchanges in general, and in critical discussions in particular. Throughout this section, we outline some of the general principles of informal logic, argumentation, and communication theory.

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These chapters are followed by a general discussion.

2. Argument: Structure and use

Our first objective, when starting this research, was to define critiquing within the vast field of argument studies. Yet, literature in this domain makes no mention of critiquing as a distinct type of discourse having its own function, structure and dynamics.

Now that relevant research has been carried out, it seems that a critique is in fact an argument in itself, where a claim or a position regarding a problem is supported by one or several propositions. However, the specificity of a critique as an argument is that its purpose is to challenge (the product of) some reasoning, in other words, another argument.

In this section, we first examine the structure of an argument as an inferential relation between a claim and a set of premises and show how this structure can be transposed into a model of critiquing. While defining the purpose, the object and the scope of a critique, we distinguish it from close concepts such as evaluation and criticism. In the second part, we focus on the use of arguments in everyday discourse and the dialectical character of argumentation, a framework within which we then attempt to situate critical discussion.

2.1 Argument structure

'Reasoning is the making or granting of assumptions called premises (starting points) and the process of moving towards conclusions (end points) from these assumptions by means of warrants. A warrant is a rule or frame that allows the move from one point to the next point in the sequence of reasoning [2].'

Reasoning is different from argument in that it is an abstract structure which takes place *in* argument but can be used in other pragmatic contexts as well. In addition to embodying the process of reasoning, an argument is also a social, interactive and goal-directed tool of persuasion.

To see the structure of an argument, one can refer to one of the major works in argument studies, which is Stephen Toulmin's *Uses of Argument* [3]. Toulmin proposes a model of inferential relations [Figure 1] that accounts for practical reasoning[1] although based on a deductive rather than dialectic theory of argument [see Section 2.2.1.]. Using the vocabulary of legal domain, Toulmin proposes a structure composed of six elements that reflect the procedure by which claims can be argued for.

[1] *Practical reasoning* is a kind of goal-directed reasoning that seeks out a prudential line of conduct for an agent in a particular situation. *Theoretical reasoning* seeks evidence that counts for or against the truth of a proposition [2]. See:

4. von Wright, G.H. (1972) On So Called Practical Inference. *Acta Sociologica*, **xv**: p. 39-53.

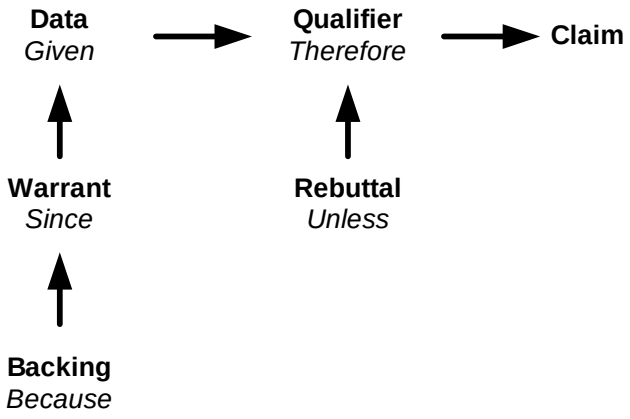

Figure 1. Toulmin's argument structure

The components of an argument as shown above are:

1. *Claim (C)*. An assertion or a conclusion presented to the audience and which has potentially a controversial nature (it might not meet the audience's initial beliefs).

2. *Data (D)*. Statements specifying facts or previously established beliefs about a situation about which the claim is made.

3. *Warrant (W)*. Statement which justifies the inference of the claim from the data.

4. *Backing (B)*. Set of information which assures the trustworthiness of a warrant. A backing is invoked when the warrant is challenged.

5. *Qualifier (Q)*. Statement that expresses the degree of certainty associated to the claim.

6. *Rebuttal (R)*. Statement presenting a situation in which the claim might be defeated.

This structure can be illustrated by the example in [Figure 2]:

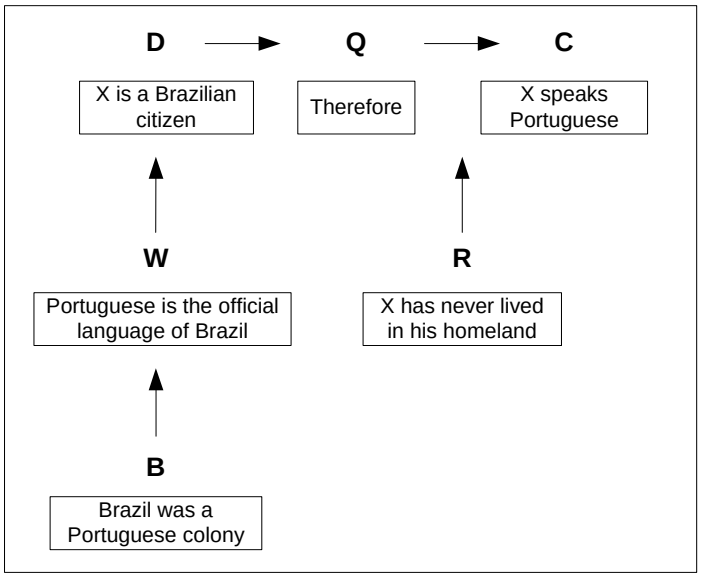

Figure 2. Illustration of Toulmin's model

In addition to the premise-conclusion structure, Toulmin identifies several components that support the inferential relation. The *warrant* has the function of a rule of inference, licensing the conclusion on the basis of the arguer's data or grounds. Such a rule of inference, as Hitchcock remarks [5], may be grounded semantically, scientifically, legally, or in a myriad other ways. The arguer can evoke a *backing* if the warrant is challenged or insufficient.

The *modal qualifier* is a word or phrase that indicates the force of the warrant, whether it holds universally, usually, presumptively or merely sometimes and the *rebuttal* is a peculiarity of arguments whose warrant justifies only a presumption that the conclusion is true. Such presumptions are subject to rebuttal, by showing that some exception-making condition is applicable [5].

The inference relation between the data and claim can be broken down by a number of *defeaters*. For example, *undercutting defeaters* attack the connection between a prima facie reason and a conclusion. Such defeaters provide clues as to how a critique might challenge an argument.

In this regard, Pollock [6], who has extensively worked on defeasible reasoning, addresses several interesting questions. He postulates that reasoning operates in terms of *reasons*, which can be associated to support arguments. He distinguishes *non-defeasible* reasons and *defeasible* reasons which are defined in terms of *defeaters*. Defeaters are new reasons that attack the justification power of a given defeasible reason. Pollack first rejects the *accrual of reasons* principle, according to which two arguments for a conclusion can result in a higher degree of justification than either

argument by itself. However, he argues that defeaters (counter-arguments to a conclusion) that are too weak to defeat an inference outright may still diminish the strength of the conclusion. While he denies that, in general, a combination of defeaters can undo an argument that any of the individual defeaters cannot undo, he has found compelling examples that support this concept of “collaborative” defeat. In the light of these results, one may conclude that a critique might not have the objective of invalidating an argument, but only of diminishing the strength of the support for the resulting claim by presenting a number of counter-arguments of varying strengths.

Pollock proposes three types of defeating arguments:

- Rebutting defeaters (a reason that attacks a conclusion by supporting the opposite position);
- Undercutting defeaters (a reason that attacks the connection existing between a reason and a conclusion);
- Specificity defeaters (if two arguments lead to conflicting conclusions but one argument is based upon more information than the other, then the "more informed" argument defeats the "less informed" one).

A proposition is warranted if it emerges undefeated from an iterative justificatory process in which the same argument can be successively defeated and reinstated.

But, why is it that an argument may be challenged in the first place? In fact, what the reader does not see in the premise-conclusion structure, which constitutes the argument’s ‘illative core’ [7], is the pragmatic dimension: why is it that the conclusion needs support? The claim/conclusion needs support because it is in some respect controversial, and the arguer is trying to rationally persuade the *Other* of its truth.

Because the conclusion is potentially controversial, an arguer will need to do more than put forward some supporting statements. He or she will need to respond to objections and alternative positions. Yet, the illative core by itself does not address such questions and can therefore not constitute a complete argument. Accordingly, Johnson [7] argues for a ‘second tier’ of argument, which he calls ‘dialectical tier’ and proposes the following definition:

“An argument is a spoken discourse or written text whose author (the arguer) seeks to persuade an intended audience or readership to accept a thesis by producing reasons in support of it. In addition to this illative core, an argument possesses a dialectical tier in which the arguer discharges his dialectical obligations.”

The ‘dialectical tier’ is not only a feature of spoken discourse. Any argumentative text anticipates and responds to possible objections at some point. Ducasse and Toussaint [8] depict the unfolding of written argumentation as we have illustrated below:

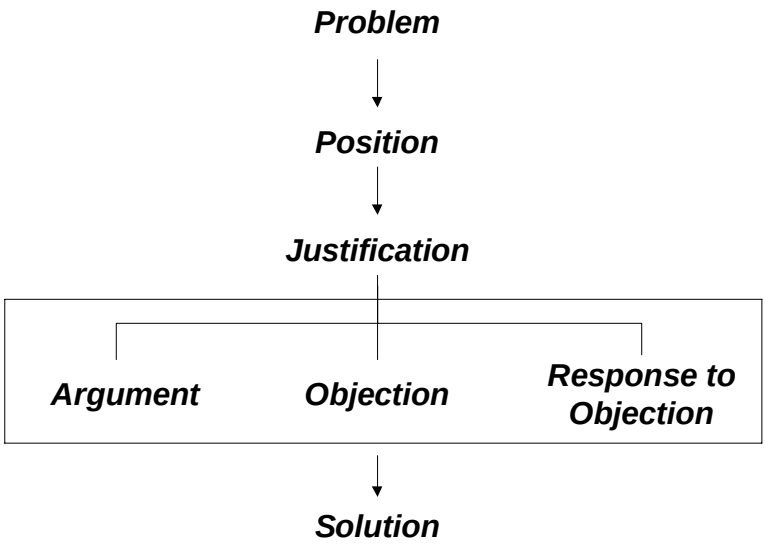

Figure 3. Structure of argumentative texts

The *problem* as such can concern the conception of reality, the evaluation of reality or the prescription of a conduct. One can adopt an assertive, a directive or an evaluative *position* to respond to the problem in his *justification*, which minimally comprises an *argument*. Anticipating possible *objections* and responding (*response to objection*) to them clarifies and reinforces the argument. Finally, a proposed *solution* concludes the argumentation.

There are different ways in which a position can be supported. Snoek-Henkemans [9] observes that laying out the structure of an argument is not only necessary to understanding how arguers defend their positions, but is also indispensable for evaluating their argumentation. An overall judgment of the quality of a complex argument requires not just a clear picture of individual arguments, but also insight into the relations among them. Two approaches to argument structure are distinguished:

- The functional approach of the classical theory of stasis and of the debate tradition (conflict of opinions);
- The logical approach of identifying argument structure with different inference types:
    - Serial reasoning (or subordinate argumentation)
    - Linked reasoning (or coordinate argumentation)
    - Convergent reasoning (or multiple argumentation)

Reasoning is serial if one of the reasons supports the other. If reasoning is linked, each of the reasons given is directly related to the standpoint, and the reasons work together as a unit. When each reason separately supports the standpoint to some degree, the reasoning is convergent. A complex argument can combine all of these types of argument structure.

The inferential relation can be inductive or deductive, but also presumptive [10] when the needed evidence is not yet available. It is important to mention that other types of relations have also been identified within what may be called a new theory of inference in informal logic [see Section 2.2].

As to the warrant of arguments, general norms, valued goals, etc. can be used to justify a position in everyday argumentation. For instance, Breton [1] distinguishes four classes of arguments:

- Arguments based on authority;
- Arguments based on shared premises;
- Arguments based on a view of reality;
- Arguments based on analogies.

The argumentative strategy can be deployed through a variety of argumentative schemes. In their treatise of argumentation and rhetoric, Perelman and Obrechts-Tytecta [11] classify common argumentative schemes into two main categories: argumentation by association and argumentation by dissociation. The first category includes: 1) quasi-logical arguments, 2) arguments based on "the structure of reality", and 3) arguments founding "the structure of reality". The second category consists of arguments where two concepts that the audience considered as a whole are separated (‘You talk of law, I talk of justice’).

Within the first category, quasi-logic arguments designate those arguments that look like logical and mathematical proofs but which lack their exact and formal character. This category includes, among others, arguments based on a contradiction or incompatibility relation (e.g. strategies that help avoid an incompatibility or aim at presenting two claims as compatible or incompatible); arguments based on a definition or an identity relation; transitive arguments (ex. ‘My friends’ friends are my friends’), arguments based on an inclusion or a part-whole relation, comparison-based arguments, probabilities-based arguments, etc. Arguments based on the structure of reality often use the causality relation (‘Eating less fat helps slimming’), while arguments establishing the structure of reality use rhetoric relations such as example giving, illustration or analogy. These schemes are quite useful in that they characterize the most commonly used argumentative techniques in human dialogues.

2.1.1 Scope of a critique

The preceding remarks are also valid for critiques. A critique exhibits the same discursive structure as any other argument deployed for persuasive or demonstrative purposes. However, the specificity of a critique lies in its objective and the reasoning that precedes the argumentative stage. A critique is an argument targeting another argument, or more particularly the position adopted by the source of that argument. Let us call this source the proponent, whom we assume to be different from the critic.

Contrary to the proponent, who introduces a *problem* and argues in support of his/her *position* with regard to that problem [Figure 3], the critic does not base his/her argumentative discourse directly on a position or a point of view. The critic identifies the problem introduced (implicitly or explicitly) by the proponent, identifies the proponent's position, and according to whether he agrees or disagrees with that viewpoint, elaborates a given argumentation. Thus the critic deals with the *problem* evoked in the proponent's discourse by proxy (see Figure 4).

For the critic, the *problem* is not the reality dwelled upon by the proponent, but the position of the latter with regard to that problem. This in turn becomes the critic's *problem* and the triggering point of his/her argumentation. To avoid confusion, we call the critic's problem the *issue* [Figure 4].

The critic may or may not argue in favour of his/her own position with regard to the problem discussed by the proponent. This is not the purpose, and not even the role of the critic. The critic can criticize a product without ever expressing his own opinion. Of course, any discourse can be obscure - and even deceptive - with regard to the speaker's beliefs, and any speaker can choose to conceal his/her opinion; however, in the case of the critic, this is somehow a required condition. The critic is expected not to express, or at least not to elaborate on his opinion and focus instead on what he/she is critiquing.

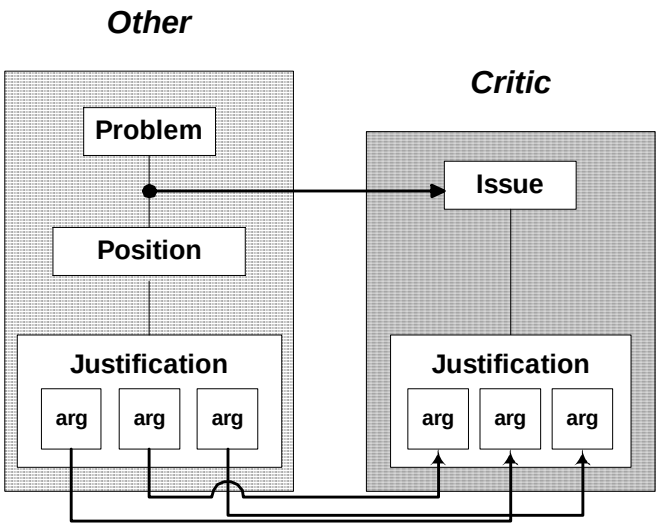

Figure 4. Structure of a critique

In order to argue for or against the proponent's position (the proponent's conception or evaluation of a certain reality), the critic has to first make it as explicit as possible, that is to show what is the problem (or the theme) around which the proponent has organized his/her discourse/product (this may not be explicitly stated), what is the proponent's position with regard to that problem and what are the arguments that give evidence of this position.

Unlike other types of argumentative text, a critique does not have an independent line of reasoning, because it does not exist outside the product it critiques. The critique goes back and forth between its proper argumentation and its matter for thought, provided by the *Other*'s argument.

As illustrated in Figure 4, the position adopted by the proponent with regard to the problem becomes the issue for the critic. In order to justify why this is an issue, which is the core of the critic's work, the latter has to first convince his audience that this is indeed the author's position. While doing this analysis, he has to explain why that position is or is not acceptable given whatever norms (aesthetic, moral, etc.) are being considered.

The critic praises or criticizes the proponent's position while eliciting and analyzing each of his arguments. The important point here is that although the object being critiqued is the product, the target of the critic is not the product itself, but what it represents, that is the position adopted by the proponent with regard to the problem. The product is only the evidence of the reasoning mode judged by the critic. This is why, when the critic examines the arguments and their support for the claim being made, he does not intend to

evaluate the validity, soundness or strength of the arguments themselves, but tries to make the relation argument-position explicit.

This is precisely the difference between the *evaluation* and the *critique* of an argument. The purpose of an evaluation is to assess an argument for what it is, that is to measure how adequate the premises are and how strongly they support the conclusion. The argument is then evaluated as being weak or strong, valid or invalid, etc.

A popular set of criteria for evaluation of arguments, proposed originally by Johnson & Blair [12], is the triad of acceptability, relevance, sufficiency. Each premise must be acceptable; each premise must be relevant to the conclusion; and the premises must be jointly sufficient.

The purpose of a critique, on the other hand, is not to evaluate the argument, but to identify and judge the position it supports. Each argument-position relation singled out by the critic becomes in turn one of his own arguments, justifying the point he is making [Figure 4]. Each element transferred in this way from the proponent's argumentation to the critique is analyzed and judged with respect to the critic's attitude (agreement, disagreement) towards the proponent's position.

This does not mean that the critic is not concerned with premise adequacy. When examining the arguments, the critic can question the credibility of the facts/arguments put forth by the proponent (*substantive criticism*) or question the causal relation between the justification elements and the conclusion (*logical criticism*). Therefore the critic can assess the argument, but not just for that purpose.

A set of criteria for critiquing have to be clearly identified or maybe redefined from those used for argument evaluation, which are acceptability-relevancy-sufficiency. Relevance for critiquing may not mean the same thing as 'contribution to the truth of'. In the following example, the critic questions the relevance of the arguments, but this is more about what the critic sees as an argument-position mismatch:

"Allen keeps using those lovely, crackly jazz recordings as a backdrop -- there's lots of Billie Holiday and some Lester Young here -- as if he actually thinks (or, worse yet, simply wants us to believe) he's keeping true to their wistful romantic spirit. But he has only hijacked them: They have heart, whereas he has none. I know he professes to love this music, but the narrative he hooks it up to threatens to suck it dry." (An excerpt of Stephanie Zacharek's review of the movie 'Anything Else' by Woody Allen in *Salon*)

Here, it is indeed the justificatory process that is at fault. In fact, as expressions like '[not] keeping true to the spirit', 'they have heart, whereas he has none', 'hijacked' clearly indicate, the arguments (the score in this case) and the conclusions they are supposed to induce do not match the real

position-problem relation. Moreover, since critiquing is concerned with the author's position/attitude, the argumentation used in this movie is considered to be worse than irrelevant: it is dishonest.

As we can observe, the critical mechanism does not only apply to prototypical arguments, but to any product that presents an implicit or explicit argument structure. The structure shown in Figure 3 does not only underlie argumentative texts, but any kind of organized discourse, be it written, oral or visual and whether it recounts real or fictitious events. In fact, the object of a critique is any product whose reasoning path can be traced.

Even the 'superstructure' of narrative texts [13], which shows how a story builds up to a resolution, often comprises an argumentative dimension. The resolution or the moral of the story is the pragmatic function (*finalité pragmatique*) that guides the whole plot [14]. As Walton [2] writes on this broad notion of argument: 'In this sense, an argument is not just a localized step of inferences, consisting of a small number of premises and a conclusion, connected by a single warrant. Instead, it is a long thread or fabric that runs through and holds together an extended discourse or argumentative text. In this sense, the argument could have originally been a linked sequence of sub-arguments, ranging over an entire book for example.'

It is interesting to note here that the extension of the concept of argument is one of the recent areas of research in the field of informal logic [15]. Groarke [16] and Blair [17] include visual communications such as works of art as argument.

In reviews of art and literature, although many aspects can be *discussed* individually (e.g. plot, editing, characters, etc. in movie reviews), they are only *critiqued* with regard to their contribution to the message conveyed by the author/creator. As long as his/her position has not been identified, none of the individual elements or aspects of his/her work can be fully interpreted.

Another question, debated between Johnson and Govier for argument appraisal and which can apply here, is whether argument typology (deductive, inductive, conductive, analogical, etc.) is relevant to critiquing. Data can deductively imply the claim, inductively support it, or give other types of evidentiary support. This may have an effect on the critique, since it may be argued, for example, that the author does not have a clear position on the subject or that he insinuates things in a pernicious way. Also, the critic might consider that according to certain values, some inferential relations are more appropriate (morally, aesthetically, politically, etc.) than others to vehicle an opinion.

We must also note that the inferences induced by the author-creator can be very different from one context to another. A filmmaker or a writer expects his audience or readership to make some deductions on their own (one can think of references made in art and literature to Greek mythology, Freudian

psychology or movie classics, just to name a few), while a politician might prefer to bring his audience to certain conclusions himself. Critiquing can be useful in both cases, although using different mechanisms, since in neither case one can make sure that the message has been correctly interpreted.

In all cases, a prerequisite to critiquing and critical thinking is knowledge of domain. It is only the knowledge of the meaning of arguments that can allow an individual to relate them to an opinion. The argument-position relation can be purposefully dissimulated, blurred by some more accessible inference, or even effectively undetectable. It takes a certain amount of knowledge in each domain to identify this relation and to justify it for a given audience.

2.1.2 Critique, evaluation, criticism

Our broad definition of argument will have a direct effect on the definition of norms and criteria to be used in critiquing. This is why Johnson [7] urges the development of a theory of argument that will provide an account of the nature of argument, from which a coherent and usable set of norms for appraisal can be derived.

As Johnson and Blair [15] remark, one's general theory of argument will be pertinent to issues of the analysis of arguments, and thereby for a theory of evaluation. Thus, in a theory of evaluation, it is the perspective that distinguishes a good from a bad argument (an argument can be rhetorically good, logically good, etc.).

As for a theory of criticism, Johnson and Blair [15] write: we have long held for a distinction between evaluation (identifying the criteria of good and bad) and criticism (the act of criticism, including the application of the criteria of good and bad argument, but also the public act of critique). The act of argument criticism presupposes a normative theory of the function of such criticism. Such a theory in turn presupposes a normative theory of the roles of argumentation. If argument is properly used to accomplish a set of aims, then the public critique of arguments will be related to their contribution to achieving those aims [15].

As to the distinction between evaluation and criticism, he says, reported in [18]: 'We evaluate, say, a movie, if we pronounce it good or bad – and when we do so, we presumably have some standards in mind. But to evaluate a movie is not yet to criticize it. To criticize it, we have to articulate our standards, show evidence as to why the movie did or did not meet them, and put our comments into some kind of coherent perspective. To evaluate something is to pronounce it good, bad, or indifferent – or somewhere along the spectrum. To criticize it is to develop an account of its strengths and weaknesses, an account that shows some discrimination between more and less significant strengths or weaknesses and can give assistance as to how the product might be improved.'

Therefore, according to these authors, two elements mainly distinguish a critique or criticism from an evaluation. One is the analysis task inherent to critiquing; the other is the dialectical character of critiquing (aimed at proving the product) or the public act of critique as Johnson calls it.

We claimed that the main difference between the two is basically one of scope. Evaluation and critique assess the argument structure at different levels: an evaluation is concerned with the inferential relation between the premises and the conclusion (the arguments and the claim/position) while a critique is concerned with the relation between the conclusion and the reality it is about (the claim/position and the problem).

When talking about a theory of criticism, Johnson and Blair also emphasize the role of argument in accomplishing a set of aims, whereas they talk of criteria when talking of argument evaluation.

Literature in argument studies extensively discusses the premise-conclusion (or the argument-position) relation. Yet, one important thing about argumentation is that no argument exists without an opinion and only opinions are argued for[2]. Critiquing is the only means by which one can reach the opinion underlying the argument.

If the analysis task is more important in the case of critiquing, as observed by many authors, it is precisely because the critic must shed light on the opinion behind the argument. The critic must also analyze the proponent's argumentation with respect to elements that are external to it (the reality about which an opinion is expressed), and not to its internal mechanism, as is the case with evaluation. Moreover, when targeting an opinion rather than an argument, which is a more or less logical structure, the critic appeals to more subjective norms and must therefore consolidate each of his arguments with evidence-based justification. Often the critique has to first de-construct its material and reveal its argument structure, as for narratives, before evaluating it with respect to some standards.

Finocchiaro [19] distinguishes the evaluative and the analytic approaches to define the different functions of *critical reasoning*. This is reasoning aimed at the analysis, evaluation or self-reflective formulation of arguments. Here, analysis means identifying, distinguishing, and interrelating various elements (basically propositions) for the purpose of understanding the reasoning. Evaluation means determining whether the reasoning is valid or invalid, strong or weak, cogent or fallacious, and so on. Self-reflective formulation of arguments means arguments that exhibit an appropriate degree of self-analysis and self-evaluation. The 'purpose of understanding the reasoning', used here for the analytic approach, to which we can add 'in order to

[2] One can discuss, prove and verify physical phenomena among scientists, but one cannot present arguments for them because these are not opinions or hypotheses. See:

1. Breton, P. (2001) *L'argumentation dans la communication*. Paris: Édition La Découverte. 120.

formulate and justify a judgment' is, in our view, an adequate description of the critiquing approach.

To complete the picture, we can present a linguistic distributional account, which is often insightful when it comes to meaning distinction. Evaluation has a different use than critique given that it applies to attributes and characteristics. Whether it is a person, an object or an abstract entity that is concerned, its evaluation is performed relatively to dimensions that can *characterize* that entity. For example, you can evaluate the solidness of a table (but you cannot critique it.). Freeman [20] shows that *evaluative statements* may have a number of uses, including expressing approval or disapproval of something as a means to some end, asserting that some person or thing satisfies or fails to satisfy certain normative criteria, or judging the merits of some policy. An evaluation characterizes something as either good or bad, better or worse, preferable or avoidable; an act as either right or wrong, obligatory, permissible, or forbidden; a person or character as praiseworthy or blameworthy; an action as morally good or morally bad.

On the other hand, critiquing, in our view, is always concerned with the idea (or the ideology) that has led to a given product. One cannot critique a product merely to characterize it, critiquing a product presupposes that the reasoning behind it is traced back to a position. In this sense, critiquing is more of an inductive reasoning since it moves up from specific observations to some conclusion.

In English, a distinction is also made between 'critiquing' and 'criticism'. While the evaluation of a feature, a person or an entity does not imply any negative connotation, its criticism certainly does. To see the difference, one can compare *evaluating the reliability of a product* and *criticizing* it. In the latter case, we take it for granted that in the eyes of the critic, the product is not reliable.

This does not mean that criticism is confined to the meaning of 'finding faults' or 'putting down', at least not in all contexts. There is also an intellectually serious criticism that Nowlan [21] defines as "to evaluate on the basis of an interpretation." This is criticism which judges, but which, at the same time, explains and justifies its judgement.

Nowlan observes that many intellectual "critics" have drawn an often quite useful distinction between *criticism* and *critique*:

- Some critics suggest that "critique" is all "criticism" which is concerned with *explaining* how and especially *why* the problems and limitations it identifies in its object exist as they do: i.e. to explain what gives rise to and makes possible - indeed, at times, makes necessary - the existence of these problems and limitations. Critique, in other words, does not content itself with merely announcing that it finds object X to be problematic and limited in ways Y according to standards and criteria Z, but instead

always proceeds beyond this to provide an explanation for why these problems and limitations exist - and persist - as they do.

- Other critics suggest that "critique" is roughly equivalent to what Nowlan himself describes as "political criticism," while "criticism" is roughly equivalent in turn to "moral criticism." Moral criticism, based on moral standards, tends to praise or blame by locating responsibility strictly within the "nature" or "character" of an individual, group, society, or culture. 'Political Criticism' is concerned with understanding why things are or become the way they are. 'In other words, political criticism asks what made the individual, group, society, or culture the way it is - what are the conditions that have made it possible to be as it is, what are the forces that have shaped and produced it to be as it is, what are the ends which have been advanced because it is the way it is, and what are the interests which have been served because it is the way it is.'

- Still others are even more precise than this in marking out a distinction between "critique" and "criticism." These critics suggest that "critique" is concerned primarily with understanding an object sufficiently to enable its "transformation" (and not merely its reformation) by accounting for its dynamic connections with and determinations of and by other objects within a series or totality of related objects. "Critique" attempts to understand why an object is as it is so that it can be changed, most often in a fundamental or radical way so that it will be made something substantially new and different such that the "old object" is either substantially improved and enhanced or has been substantially transcended and superseded. "Criticism", in contrast, is understood by these critics to remain content with passing "judgement" upon an object in a way which "reifies" the object, separating and freezing it in abstract isolation from its real and concrete relations with other objects. Criticism is *not* directly concerned with or interested in understanding so as to change its object.

All these definitions are in accordance with the analytical approach we referred to earlier. A critic makes certain observations and develops an explanatory theory in order to account for them. This is why we spoke of inductive reasoning. As for the transformation issue, other authors have also mentioned it. Johnson in his *Manifest Rationality* [7] writes: 'Criticism goes beyond evaluation in that it is an articulated and reasoned evaluation intended for the one who produced the argument or created the product as a vehicle whereby the argument/product may be improved. Thus it may be said that criticism is part of a dialectical process, whether evaluation is not.'

Once again the concept underlying critiquing is that of analysis, be it with or without a perspective of change. This means that a critique does not isolate its object from the standpoint that brought it to existence. Naturally, this constrains the nature of the entity that can be critiqued. Such an entity can

only be the result of a reflective process. All other entities are either criticized or simply evaluated, not critiqued.

Moreover, critiquing as a type of argumentation is part of a dialectical process, while evaluation and criticism in the restricted sense are not. This means that a critique cannot be formulated irrespective of the values, opinions and beliefs of the audience to whom it is addressed.

To understand this phenomenon, one must shift from deductive models to dialectical ones as they have been described within the framework of informal logic and argumentation theory.

2.2 Argumentation

The previous section presented an argument as a mould shaping some reasoning. But as we wrote in the beginning of that section, argument is different from pure reasoning in that it is a social, interactive and goal-directed tool of persuasion.

As Walton [2] observes: ‘Reasoning can be aimless, but argument is essentially goal-directed. And so when reasoning occurs in a context of argument, that reasoning is purposive. Just as reasoning occurs in arguments, argument occurs in a larger context of activity. Most often, argument occurs in dialogue.’

The interactive and dialectical character of argument has been underscored by van Eemeren and Grootendorst [22]. Contrary to the traditional view which portrays argument as an externally manifested set of propositions "designated" as premises and conclusion, these authors’ pragma-dialectical approach emphasizes public commitments over personal beliefs, and sees an argument not as an internal, mentalistic process but as a rule-governed kind of communicative activity wherein two parties attempt to resolve a conflict of opinions. According to this much broader approach, an argument is more than just a set of propositions. It comprises many kinds of speech acts, evaluated in a goal-directed, normative model of dialogue.

‘Such a pragmatic perspective suggests a new way of defining *argument* to make it coextensive with argumentation. The only difference between the two is one of connotation. ‘Argumentation’ refers to the global process of defending and criticizing a thesis (point of view) which spans the whole context of discussion. The term ‘argument’ can also have this meaning, but is often used for practical purposes to refer to a local segment of a chain of argument, comprising specifically designated premises and conclusions.[2]’

This dynamic aspect of argument also referred to as argumentation and defined as an ‘interpersonal, social, purposive practice’ [5] is essentially studied within the framework of informal logic. Studies rooted in informal logic challenge the traditional concept of an argument as a premise-conclusion complex, objecting that this approach ignores the purpose for which such structure is used. Instead, they favour speech-act, functional and dialogical conceptions.

More generally, informal logic has been defined as follows:

"Informal logic, also called practical logic, [designates] the use of logic to identify, analyze, and evaluate arguments as they occur in contexts of discourse in everyday conversations. In informal logic, arguments are assessed on a case-by-case basis, relative to how the argument was used in a given context to persuade someone to accept the conclusion, or at least to give some reason relevant to accepting the conclusion." (*The Cambridge Dictionary of Philosophy, Second Edition*)

Johnson & Blair [15] consider informal logic as distinct from formal deductive logic, epistemology and critical thinking, and define it as designating "that branch of logic whose task is to develop non-formal standards, criteria, procedures for the analysis, interpretation, evaluation, critique and construction of argumentation in everyday discourse […] This logic is non-formal in the following respects. It does not rely on the chief analytic tool of formal deductive logic, the notion of logical form. Nor does it rely on the main evaluative function of formal deductive logic validity. But that does not mean this logic is non-formal in the sense that it abandons reference to standards, criteria or procedures".

From the perspective of a theory of language use, Goldman [23] takes the position that argumentation is better thought of as social epistemology rather than as informal logic.

In formal logic, as he says, an argument is a set of sentences or propositions, one designated as conclusion and the remainder as premises. On this conception of argument, there are two kinds of goodness. An argument is good in a weak sense if the conclusion either follows deductively from the premises or receives strong evidential support from them. An argument is good in a strong sense if, in addition to this, it has only true premises. Thus, in the strong sense, the paradigm of a good argument is a sound argument. The foregoing construes an argument as a set of sentences or propositions, abstractly considered.

In another sense, however, an argument is a complex speech act in which a speaker presents a thesis to a listener or audience, and defends this thesis with reasons or premises. More precisely, such a speech act by a single speaker is a monolectical argument. A dialectical argument is a series of speech acts in which two (or more) speakers successively defend conflicting positions, each citing premises in support of their position. Whether monolectical or dialectical, this is an interpersonal or social sense of "argument", quite different from the abstract sense; and it seems likely that criteria or norms of goodness for this sense of "argument" differ from the criteria cited above. This social sense of "argument" is what the author calls argumentation.

In order to account for the application of an argument in an act of discourse, we have to further elaborate on communication models, the dialectical character of argumentation, and the concept of speech acts. The first two topics are discussed in the following sections and conclude the chapter on the structure and use of argument. Speech acts will be presented in a separate chapter where arguments are analyzed with respect to the participants' perspective.

This will provide some insight into the use and dynamics of critiques as a specific type of argument, which although different from typical arguments by its mechanisms, pursues the same persuasive objectives.

2.2.1 Dialogical and dialectic nature of arguments

The first characteristic feature of argumentation is that it is a dialogical exchange. This is why conversation analysis is relevant to the understanding of the dynamics of argumentation.

Conversations have the following general features [24]:

- They are highly context-dependent;
- They vary in form among different societies and cultures;
- They are governed by flexible rules;
- They are subject to rules that are generally applied in an unconscious manner and are learned over time rather than systematically through study.

In terms of organization, a conversation is structured in hierarchical units, which are top-down:

- The interaction (meeting or event);
- The sequence or episode which is a block of exchanges dealing with the same task, theme or subject;
- The exchange which is a pair of successive actions or locutions by the participants;
- The intervention which is a contribution by one of the participants;
- The language action which is a question, request, statement or excuse.

Language actions are combined by a participant to form an intervention; two participants can generate an exchange; a set of exchanges forms a sequence and a series of sequences constitutes an interaction [24].

For a conversation to progress, each contribution must meet certain requirements of cooperation. These principles, identified by Grice [25] are known as Gricean maxims:

- Maxim of Quantity:

        - A contribution must contain the information required at that point in the exchange;
        - A contribution must not contain more information than is required.
- Maxim of Quality:
        - A contribution must not make statements believed false;
        - A contribution must not make statements for which there is insufficient proof.
- Maxim of Relevancy:
        - Statements must be to the point.
- Maxim of Clarity:
        - Avoid obscure statements;
        - Avoid ambiguous statements.

Such principles of cooperation must be respected in every conversation, even in argumentative exchanges where there is a controversial issue that opposes the participants. In fact, even conflict situations require some degree of cooperation on the part of the different parties in order to progress.

From a communication theory perspective, argumentation is a reasoning in a situation of communication [1].

Based on the traditional triangle of 'issuer-message-receptor' studied in all sciences of communication, Breton defines argumentation as comprising the following levels [1]:

- The *opinion* of the speaker: belongs to the domain of the plausible; can be a thesis, a cause, an idea, or a point of view. This opinion exists as such before being shaped as an argument. An opinion, in this sense, is formed from an individual's beliefs, values, representations of the world and trust in others. But at the same time, this opinion is mobile and in perpetual mutation, submitted to others and evolving in a stream of permanent exchanges. Opinion is different from certainties, faith, or feelings, which are out of the scope of any discussion (but not necessarily out of the scope of doubt).
- The speaker: who wants her/his ideas to be shared by others.
- The argument: the opinion shaped to convince; there should be no discrepancy between the opinion and the argument even if they are

distinct. It is possible to present things differently when dealing with different audiences, but there must not be any contradiction between the opinion defended and the argumentative mould. The opinion and the argument must be consistent or at least tightly linked. Using an argument just because one knows that the audience will be receptive to it, without sharing it ourselves, is closer to manipulation than argumentation.

- The audience: can be a person, a public and in some extreme cases the speaker him/herself.

- The context of reception: includes all the opinions, values, judgments that a given audience shares, which are prior to the act of argumentation and which will play a role in the reception of the argument, in its acceptance, its refusal or the variable adherence that it will entail.

In this schema, the goal pursued is to make an opinion integrate into a context of reception. The speaker, the argument and the audience are, according to this perspective, the media through which the transfer process is performed [1].

Talking of argumentation in terms of communication implies that one take into consideration the circumstances under which the argument is received. As Breton remarks, no proposed opinion lands on an empty ground. Each individual already has an opinion on the subject and the arguer's opinion will fall within the scope of a set of representations, values, and beliefs that are specific to the targeted audience. Arguing implies that one act on the opinion of the audience so that some room is made for the opinion that the speaker is proposing. 'Strongly stated, arguing is building an intersection between mental universes in which each individual lives'.

Argumentation, more than any other type of discourse, is an audience-centred communication. To be of any use, to have any impact, the preparation and presentation of arguments must consider the receiver and the feedback that he/she provides. The notion of audience is important since the same argument can produce very different results when addressed to different kinds of people. The aim of the orator will then be to identify the characteristics of the audience to which he or she can appeal in order to be more effective [26]. According to Breton [1], the transformation of an opinion into an argument with respect to a particular audience is precisely the object of argumentation, therefore, arguing also consists in emphasizing those aspects of an opinion that will make it acceptable to a given audience.

It is often the audience-tailored character of argumentation that justifies its dialectic nature. Dialectic argument, as Aristotle [27] has defined it, is an argument using premises which might not be evidently true, and whose aim is to make the conclusion more acceptable to the addressee, as opposed to demonstrative reasoning which deals with certainty and valid inferences.

It appears that the dialectic process also implies collaborative reasoning. As Walton [2] puts it: ‘Dialectical reasoning occurs where there are two participants reasoning together, and the reasoning of each participant contains steps derived from the reasoning of the other. Monolectical reasoning is nondialectical, i.e., a single reasoner can function alone, requiring no input from another reasoner.’

Goldman [23] distinguishes two subspecies of argumentative discourse according to the audience to whom it is addressed:

- Dialectical discourse, where the hearer periodically adopts the role of speaker;
- Debate or disputation, where argumentative exchange seeks to persuade the audience, not the antagonist.

Govier [18] writes that the process of argumentation is in crucial respects dialectical because the arguer appeals to the Other’s beliefs and reasoning and must make his or her argument responsive to the beliefs and queries of the Other. Consequently, the arguments that are products of that process should reflect the dialectical contexts in which they are located.

In *The New Rhetoric*, C. Perelman and L. Obrechts-Tyteca [11] also observe that when arguing with an opponent, people do not rely on what they know but rather try to justify their views by appealing to the values and opinions of the people whom they are addressing. Thus they define the essence of argumentation as: ‘discursive techniques allowing to induce or to increase the mind’s adherence to the thesis presented for its assent’.

As mentioned before, the arguer must expect to see his argument challenged. In his *Manifest Rationality* [7], reviewed by Hitchcock [28], Johnson defines argumentation [or argumentative discussion] as ‘the socio-cultural activity of constructing, presenting, interpreting, criticizing, and revising arguments’, to which Hitchcock adds: ‘for the purpose of reaching a shared rationally supported position on some issue’. For Hitchcock, the reference to rational support makes sense of the consideration of objections, openness to criticism and willingness to revise arguments, which Johnson rightly cherishes as hallmarks of the practice of argumentation.

In [5], Hitchcock discusses the role of the ‘dialectical tier’ and claims that even theorists who take arguments to be primarily monological rather than dialogical wish to add to the structural tier of premises and conclusion what they call a "dialectical tier", in which the arguer anticipates objections to the premises and inferential links of the structural tier. The dialectical tier is a part of the argument, because the argument is what serves the function of rational persuasion, and responding to anticipated objections is a constitutive part of an attempt at rational persuasion.

Given these two aspects, the structural and the dialectical tier, Johnson [7] defines the properties of argumentative discussion with 17 theorems which are:

1. A participant in argumentative discussion who makes a claim which requires rational support must support it with reasons.

2. Participants in an argumentative discussion may appeal to reasons (including physical evidence) and only to reasons.

3. A participant may not resort to trickery or force to get a claim accepted.

4. An argumentative discussion presupposes a background of controversy about the issue under discussion (Hitchcock points out that argumentative discussion is also appropriate in cases of perplexity where no controversy yet exists).

5. The author of an argument in an argumentative discussion has a responsibility to deal with known alternative positions and with known objections.

6. The addressees of an argument in an argumentative discussion have a responsibility to provide criticism of that argument if they believe it warranted, and the arguer has a responsibility to welcome and deal with their criticisms. The arguer agrees to let feedback from the other affect the product, to take criticism seriously; intervention of the other is not just accepted, but is encouraged, so as to make the product better.

7. Contributions to an argumentative discussion must not only be rational, but must be seen by the participants to be rational.

8. The outcome of argumentative discussion is to be determined only by the strength of the better reason.

9. Participants in argumentative discussion must be rational, and must know that they are rational.

10. The participants in an argumentative discussion embrace, endorse and cherish rationality.

11. An internal good of argumentative discussions is an increase in rationality among the participants and thus an increase in rationality in the world. Specifically, participants acquire a deeper understanding of the issue, or are rationally persuaded of a certain position on it, or come closer to an acceptable position [...] The participants exhibit rationality by giving reasons, weighing objections, modifying positions to accommodate them; the arguer acknowledges the critic’s objections, the critic acknowledges rationality in the arguer’s position.

12. Argumentative discussion depends on a specifically human form of rationality.

13. Argumentative discussion is not the only rational process.

14. A culture has a practice of argumentative discussion only if its members have a common interest in inquiry, getting at the truth or persuasion.

15. A culture has a practice of argumentative discussion only if its members seriously disagree about some important issues.

16. A culture has a practice of argumentative discussion only if its members understand and value rationality as a means of achieving their common interest.

17. A culture has a practice of argumentative discussion only if its members are open to changing their view as a result of argument.

To theorem 11, Hitchcock [5] rightly objects that 'there are other possible sequences than argument, criticism, and acceptance or refutation of criticism. The arguer might just reject a critic's objections without having found it wanting. Or the arguer might accept an objection when there is a good reason for rejecting it. Or the potential critic might fail to bring forward a crucial objection, and instead accept the argument, thus reinforcing the arguer (and the critic) in an irrational commitment to the arguer's position. Or the discussion might degenerate into angry personally abusive recriminations. In short: egocentric dismissal of justified criticism, lazy acceptance of an interlocutor's statement without careful scrutiny, 'polite' acquiescence despite awareness of an objection, or appeal to something other than the strength of the reasons.'

Hitchcock also observes that rational persuasion of the audience, or establishing the conclusion, may only be one possible function of argument. 'Claim-reason complexes can serve the functions of articulating our thought processes to ourselves as we work out the solution to a problem, explaining to somebody else why we hold a certain belief or undertake a certain course of action, giving a causal or logical explanation of some acknowledged general truth, working out the consequences of a hypothesis in order to design an experimental test of it, exposing to another person an internal inconsistency in their beliefs, and so forth. It is an open question whether these functions are parasitic on the usually privileged function of rational persuasion or proof.'

Principles as the ones cited above can also be found in Breton's [1] account of argumentation in communicational terms. He considers that argumentation involves the consideration of three principles:

- First, arguing consists in communicating: the arguer has to acknowledge that he/she has engaged him/herself in a communication situation, which

involves partners, a message and specific dynamics. An individual who tries to convince a brick wall, or who addresses what some philosophers call a universal audience, which means no one in particular, will encounter some difficulties. In this sense, an argument is never universal (while the demonstration of a mathematical theorem is).

- Second, arguing does not mean convincing 'at any price', which distinguishes it from rhetoric which is not very restrictive on its means of persuasion;

- Finally, arguing is reasoning, suggesting an opinion to others while giving them good reasons to accept it.

Arguing is more than just conceiving an argument, it is more globally, communicating, addressing someone, and giving him/her good reasons to be convinced of sharing an opinion. As such, arguing is a complex act that always falls within the framework of a larger context.

Critiquing also consists in arguing and as such, aims at convincing an audience. However, in the case of critiquing, this objective is two-fold: the critic has to first convince the audience of his assumptions concerning the position of the proponent (show evidence of this position), and he has to justify his judgment (negative or positive) of that position. In this sense, a critique can be defined as some sort of meta-argument, a status that constrains its argumentation mode.

2.2.2 Critical discussion

In a *critical discussion,* one party (the proponent) has the role of defending an expressed opinion (point of view), and the other party has the role of critically questioning that opinion [2]. Given this definition, one can see why argumentative exchange is often confounded with critical discussion. Yet, argumentation can also take place in the contexts of negotiation dialogue, pedagogical dialogue, conflict resolution, debate, inquiry, planning, expert consultation [10] or even advice-giving dialogue [26].

Moreover, there are argumentative exchanges in which the proponent does not encounter any significant resistance on the part of the opponent, as it is the case in critical discussions. As noted in [1], there are many reasons for which we might adhere to the premises of an argument:

- *Resonance*. The argument can appeal to our general vision of the world; this is mostly illustrated by value-oriented arguments;

- *Curiosity*. An argument can lead us to examine things in a new way we had not thought of; this case is often illustrated by arguments operating a dissociation of concepts;

- *Interest*. We might quickly assess the benefits entailed by the acceptation of the proposed vision of the world.

Of course, even in a critical discussion, the critic may end up adhering to the initially problematic thesis because of one of these factors. However, the type of discourse will change as the goals of the participants evolve.

A critical discussion, inherently argumentative, is a type of persuasion dialogue where a proponent must defend a claim against challenges of various kinds by an opponent or critic [22]. Interestingly, when characterizing the critical discussion in contrast to other types of argumentative dialogues, Walton [2] defines the *initial situation* as 'a difference of opinion', the *goal* as 'to convince the other party', and finally the benefits as 'understand the positions better'. Critical discussion is therefore concerned with the positions of the antagonists in a situation of dialogue, just as critiquing is concerned with the position of a proponent in the general case.

A critical discussion, and for Goldman [23] dialectical argumentation in general, can be viewed as a series of rebuttal arguments. Rebuttal can take three forms:

- Challenging (some of) the premises,
- Disputing the alleged support relation (or its strength), and
- Presenting new evidence to defeat the initial support relation.

Naturally, for the exchange to be useful and to lead to some resolution, the parties to the dialogue must maintain responsiveness. There are two forms of responsive rebuttal [23]:

- Retraction,
- Counterattack.

There are also three failures in responsiveness, which may bring the dialogue to an end:

- Evasion simply ignores objections, especially important ones.
- Misrepresentation presents a deliberate or inadvertent misconstrual of the opponent's objection and replying only to that.
- Irrelevance claims to meet a specified objection but does not address it properly or squarely.

Yet, there are appropriate and efficient ways of responding to the other party's objections. Snoek-Henkemans [9] develops a model in which rules are given for responding to criticism. When a criticism is contested, the critic can

advance more arguments, he can attempt to counter with new arguments, or he can withdraw the original argument and undertake a wholly new attempt at defending the standpoint.

While exploring the unfolding of critical discussions, Rees [29] notices that this type of exchange is also subject to certain rules of cooperation. He demonstrates that the pragma-dialectical model of critical discussion provides a useful instrument for discovering causes of an unsatisfactory development of problem-solving discussions.

Rees first gives the sketch of the development of a problem-solving discussion, which, in the opinion of the participants themselves, developed in an unsatisfactory fashion. Then he argues that this development can be traced back to flaws in the execution of the stages of a critical discussion, which he identifies as being:

- The *confrontation stage*: the differences of opinion that the discussion addresses are externalized.
- The *opening stage*: the roles of protagonist and antagonist must be distributed and the shared starting points for the discussion must be established. All participants have the role of protagonist for their own standpoints. In addition, they all have the role of antagonist against the other two standpoints and that of protagonist for the contra-standpoints against the same.
- The *argumentation stage*: the protagonist brings forward argumentation for his standpoint, to which the antagonist critically responds.
- The *closing stage*: if a standpoint has been defended successfully, the antagonist must withdraw his doubt; if the standpoint has not been defended successfully, the protagonist must withdraw it.

Applying the model of critical discussion makes it possible to enumerate the tasks which, if performed, create the conditions for a discussion to progress toward and result in an acceptable decision. These tasks would include:

- Making sure that the different standpoints which are at stake are rendered explicit
- Encouraging participants to react critically to standpoints and arguments
- Stimulating participants to take stock of their common ground
- Keeping an eye on the main thread of the discussion
- Providing summaries of arguments pro and con
- Guarding against digressions

- Making relevant distinctions
- Ensuring critical final assessment of all positions

The fact is that the participants in a critical discussion may sometimes engage in such conversations with no purpose of arriving at a conclusion or decision. They may also assume certain roles in the discussion for reasons other than their personal conviction, in which case their arguments would clearly violate the maxim of quality stated in the previous section.

The participants can also uphold a position and remain impervious to their antagonist's argumentation. An arguer may assert his or her own position rather than engaging in a back-and-forth interchange; push his or her own view even when he/she is supposed to suggest ways of strengthening the other party's arguments (e.g. referees reading manuscripts); cling stubbornly to a favoured view even it has been decisively refuted or be too focussed on the decision to be taken by the end of the discussion [28].

This is why it is important to define critical discussions not only in terms of their dynamics and with regard to the shared goals of dialogue participants, but also in terms of the individuals' intentions and motivations in a given context.

A brief outline of the Speech Acts Theory, as proposed in the next chapter, can provide useful insight into the intentional level of utterances in general. This of course will not clarify the intentions of the participants in a critical discussion since these can be as numerous and diverse as there may be reasons for, say, exhibiting an aggressive attitude. However, it will emphasize the role of the speaker in determining the type of dialogue in which he/she wishes to engage.

3. Intentions and speech acts

According to Hitchcock [5], arguing is in fact a complex illocutionary act: “In addition to being an illocutionary act with distinctive felicity conditions, arguing typically has a distinctive intended perlocutionary effect, that of persuading the arguer's intended audience to accept the conclusion on the basis of the asserted premises”.

Concepts such as locutionary, illocutionary, and perlocutionary act, are references to the Speech Act Theory, introduced by Austin [30] into the Philosophy of Language. We report here the gist of this theory as defined in the *Routledge Encyclopedia of Philosophy*:

“The theory of speech acts aims to do justice to the fact that even though words (phrases, sentences) encode information, people do more things with words than convey information, and that when people do convey information, they often convey more than their words encode. Although the focus of speech act theory has been on utterances, especially those made in conversational and other face-to-face situations, the phrase 'speech act' should be taken as a generic term for any sort of language use, oral or otherwise. Speech acts, whatever the medium of their performance, fall under the broad category of intentional action, with which they share certain general features. An especially pertinent feature is that when one acts intentionally, generally one has a set of nested intentions.

Austin identifies three distinct levels of action beyond the act of utterance itself. He distinguishes the act of saying something, what one does in saying it, and what one does by saying it, and dubs these the 'locutionary', the 'illocutionary' and the 'perlocutionary' act, respectively. Suppose, for example, that a bartender utters the words, 'The bar will be closed in five minutes,' reported by means of direct quotation. He is thereby performing the locutionary act of saying that the bar (i.e., the one he is tending) will be closed in five minutes (from the time of utterance), and what is said is reported by indirect quotation. In saying this, the bartender is performing the illocutionary act of informing the patrons of the bar's imminent closing and perhaps also the act of urging them to order a last drink. Whereas the upshot of these illocutionary acts is understanding on the part of the audience, perlocutionary acts are performed with the intention of producing a further effect. The bartender intends to be performing the perlocutionary acts of causing the patrons to believe that the bar is about to close and of getting them to want and to order one last drink. He is performing all these speech acts, at all three levels, just by uttering certain words.” (*Routledge Encyclopedia of Philosophy*)

The indirect connection between the utterance and the perlocutionary effect is inferential. Now, whether the illocutionary act was (and was taken) as a request or as a proposal depends on contextual information.

Informal logic, which also deals with the uses of argumentation schemes in a context of dialogue, interprets the uses of arguments as speech acts, ‘seeing them as moves

that incur or relinquish commitments, e.g., assertions, denials, retractions, questioning moves, etc. [2]'.

At a more global level, attempts have been made to determine the intention of the arguer or the purpose of argumentation. The intention of the arguer has been defined as showing that 'some view or statement is correct or true' [31]. For Hitchcock [28], the arguer's goal should be characterized as securing acceptance of a thesis rather than recognition of the truth of a thesis. Also, he views characterizations such as 'to arrive at the truth about some issue' and 'rational persuasion' [7] as describing the expected purpose of the participants rather than the function of the practice. He describes this purpose as reaching a shared, rationally supported position on some issue, because argumentation can be about what to do as well as about what is the case, and because argumentation focuses on the opinions of its participants, not on those of a non-participating audience.

For Walton, the purpose of an argument is "to settle an open issue with another arguer with whom one is engaged in dialogue [...] Basically, the goal of an argument is to use reasoning to get this partner in dialogue to become committed to a proposition to which he was not committed at the beginning of the dialogue"[10].

As we can see, inherent to argumentation is the intention of persuasion. A particularity of argumentative discourse is that it is triggered when the speaker feels that there is a possibility of disagreement on the part of other participants on the propositions he or she is claiming. However, as Walton remarks, it is not this goal by itself, but the dynamics of the whole dialogue thus triggered that defines argumentation. The fundamental feature of an argument, as he remarks, is the underlying speech act and the type of dialogue in which the participants are engaged. It is not the intention of the speaker or that of the hearer which defines an argument by itself, but the purpose of their ongoing dialogue as a conventional type of social activity with its own principles and normative maxims.

Interactions in general can be better defined in terms of the purpose of the dialogue rather than the goals of the participants. For example, advice-giving dialogues differ from information-seeking dialogues or tutoring in that the former involves a peer-to-peer relationship between two partners, and one of the parties' aims is to help the other with respect to some issue [26]. These are still different from decision support, where one partner has to help the other to choose among different alternatives, and from collaboration, where the two partners have to perform a task jointly.

Walton's remark is also true for critiquing, since it is impossible to determine the intentions of speakers engaged in critiquing, unless all the contextual information is available. However, as we saw in Section 2.2.2, a critical dialogue can be characterized as an instance of argumentative practice wherein each participant plays a particular role.

As we saw before, in the argumentation world, persuasion consists in using reasoning that takes the audience into account in a context of free communication [1]. The speaker is thus led to reason about the opinion of his/her audience. In fact, in any kind

of interaction, an individual reasons about her own beliefs, her partner's beliefs, her partner's assumptions about her own beliefs, their mutual beliefs, etc. The more nesting levels (of beliefs) there are, the more sophisticated the interaction is. Such representations are especially useful when misconceptions and deceitful behaviour are possible [32]. As Grasso et al. [26] observe, in a situation of cooperative dialogue, agents are only interested in communicating what they believe, and assume their opponent does the same. However, some sort of deception is inherent in the definition of dialectic argumentation. For example, in advice-giving dialogues, "The fact that the arguer bases her justification on the audience's beliefs and not on what she really thinks on the matter can be seen as a subtle kind of deception. In particular, the arguer may like a claim to pass as her own even if it is only a projection of the audience's mind."

Such deceitful strategies can also arise in critical discussions. For example, Goldman [23] makes an important distinction between 'core' and 'noncore' cases of argumentation. The following are some non-core cases of critiquing:

- First, a critique may be offered on behalf of someone else, i.e., "play the devil's advocate." This might, for example, arise when the critique is based on established policies and doctrines. The critique merely states the case from the point of view of the policy maker.

- Second, the arguer may experiment with an argument, without commitment to its premises or conclusion. He or she may invite the other party to consider premises and conclusion as possible truths, so as to test their credibility by seeing whether they survive critical scrutiny.

While the effects (intended or side-effects) of critiquing and criticism are predictable: at best critiquing can promote reflection and second thought and at worst it can produce a very negative emotional impact (see Section 4.2); the general motivations behind the act of critiquing remain more obscure. Beyond the immediate goal of the critic, which is to convince his or her antagonist of the validity of his/her claims, there are many reasons that can explain why an individual engages in such a discussion. This may be a search for truth, a better understanding of some issue through critical scrutiny, self-interested purposes, power conflicts, assistance and support, and still many other reasons. Furthermore, the participants' goals may change during the discussion, as the participants may gradually settle or ignore some issues while tackling new ones.

Thus, there may be many motivations behind a critical discussion and there are probably many strategies and non-core cases that would be interesting to further explore. Yet, whatever these higher goals may be, one can define the immediate goal of the participants engaged in a critical discussion as the persuasion of the other party of values, opinions or beliefs that one has temporarily adopted.

4. Criticism: Perception

This section is about the perception of criticism. Here, criticism must be understood as an act of praise or blame and not as an analytical tool like critiquing. Research works presented here mainly deal with criticism from the receiver's perspective. The factors discussed help to better understand how criticism must be delivered and what are the factors that enhance criticism acceptance.

One fact about criticism is that although it is the speaker's intention that determines what sort of illocutionary act is being performed, a statement can be interpreted as a criticism even if it was not intended to be. Such interpretation depends on factors that pertain to the psychological state of the receiver and the context in which these words are uttered. This is why it is always advised that criticism be delivered in context. The receiver can thus easily relate the criticism to the specific situation at hand and not speculate on its meaning. In fact, the speaker relies on the audience to rely on contextual information to interpret his/her utterance.

Naturally, interpersonal relations play a very important role in the reception of criticism. Knowing a person helps to adequately interpret what he/she intends to say in a particular situation. As we will see at the end of this section, the element that facilitates criticism reception the most is closeness of and trust in the critic.

In the following sub-sections, we first report some of the categorizations proposed for criticism. These are generally based on the target, the style or the scope of criticism and are mostly defined from the vantage point of the person who criticizes. Basically, the authors argue that critical phrasing and style can enhance or hinder critical reception. In the second part, we look at the ways in which individuals may react to criticism. Special attention will be given to social and cultural factors that influence criticism perception. Finally in the last part, we discuss the importance of trust in the critic as a major factor for criticism acceptance.

4.1 Criticism: What, why and how?

Based on their research in developmental psychology, Kamins & Dweck [33] distinguish three types of feedback:

- *Person-feedback,* which is a global evaluation of an individual's abilities, goodness, or worthiness after his performance of a specific task;
- *Process feedback,* which involves praise or criticism focusing on the strategies used or effort deployed on a task;
- *Outcome feedback,* which involves praise or criticism focusing on the outcome of the act.

The authors observe that process-feedback is inherently more positive than person feedback. Process-feedback consists of a reasoned judgement oriented towards the strategies used to perform a task, whereas person-feedback focuses on the person's abilities, goodness, or worthiness. Students or trainees who receive process-criticism are more likely to show a mastery-oriented pattern, that is, to maintain their expectations, positive effect, and positive self-assessments and continue to exhibit constructive behaviour when a setback occurs, than those who receive person-criticism. Outcome feedback, common in business and military, involves criticism focusing on the act itself or the output, not on the individual or the process.

Wernik [34] focuses on negative feedback when he examines the psychological facets of criticism in an art academy where it has a central role. He writes that *negative criticism* relates to defects, failures and deficiencies while disregarding achievements and successes. *Technical criticism* sometimes involves insignificant details and avoids central issues, while *arbitrary criticism* is an emotional reaction without intellectual analysis.

If criticism is triggered by some kind of dissatisfaction, then it is interesting to see how this feeling can be expressed. Nomura and Barnlund [35] enumerate some of the possibilities, including verbal and non-verbal modes:

- Hiding dissatisfaction from the person.
- Expressing dissatisfaction to a third person.
- Expressing dissatisfaction to the person by a slight gesture or facial expression.
- Expressing dissatisfaction to the person ambiguously.
- Expressing dissatisfaction to the person humorously.
- Expressing dissatisfaction to the person through constructive suggestions.
- Expressing dissatisfaction to the person in a direct way.
- Expressing dissatisfaction to the person with sarcastic remarks.
- Expressing dissatisfaction to the person angrily.
- Expressing dissatisfaction to the person in an insulting way.

It is interesting to add here that criticism and reaction to criticism are both mediated by personality traits and socio-cultural factors. Bresnahan *et al.* [36] investigated whether verbal aggression, argument approach, argument avoidance or assertiveness had any effect on how participants from three different countries responded to criticism. Subjects were 204 men and women from the US, 282 men and women from Japan, and 180 men and women from China. Consistent with the first hypothesis, men were significantly more aggressive and assertive, were less avoidant, and approached argument more than women. However, men did not respond more assertively to

criticism. Americans used silence to mean anger while for Chinese silence showed personal embarrassment. Very few Japanese selected silence as an option for responding to a neighbour's criticism.

In certain cases, socio-cultural factors also explain how originators of criticism adapt their critiquing style to their audience. Takeuchi *et al.* [37] studied Japanese returnees' readjustments in criticism styles. The authors observed that returnees differentiated their criticism styles based on whether they were interacting with another Japanese person or with an American. They used a straightforward approach with Americans but switched to passive and indirect criticism styles with Japanese. This led them to the conclusion that their subjects exhibited communication flexibility reflecting the social norms of the cultural context in which they were engaged.

Based on a review of the literature on the giving of criticism, Piccinin *et al.* [38] identified a series of criteria for verbal and non-verbal criticism. The behavioural criteria for effective provision of verbal criticism are: (a) taking of personal responsibility for the critical feedback; (b) provision of specific criticism; (c) provision of empathetic criticism; (d) clear request of behavioural change; (e) provision of a balance of positive and negative criticism; and (f) an overall judgment of global effectiveness in giving criticism.

The behavioural criteria for the provision of non-verbal criticism are: (a) appropriate eye contact - focused attention but not staring; (b) well-modulated voice tone and inflection versus whispered, monotone or shouted indignation; (c) facial expression consistent with verbal content; (d) well-balanced posture, directly facing the other person; (e) adequate verbal fluency/hesitancy - continuous and well-placed speech delivery without speech gaps and awkward pauses; and (f) smooth fluid gestures consistent with the verbal content and absence of mechanical/abrupt gestures.

Finally, Petress [39] offers suggestions for critics on how to usefully phrase criticism and for receivers on how to demonstrate appropriate interpretation of criticism. He remarks that critics need to carefully consider judgment context. By offering assessments publicly, in too loud or harsh a voice, in a condescending tone, or inappropriately juxtaposed with non-related messages, critics may diminish, contradict, or obfuscate well-meant criticism. Constructive criticism, more likely to be positively interpreted by receivers, must be produced in a voice that conveys genuineness and sincerity or it is likely to fail and be interpreted as insincere. Criticism needs to be prudently timed. Criticism given tardily, prematurely, or too rapidly can predictably lessen a receiver’s appreciation for the judgment. Just like Kamins & Dweck [33], the author observes that keeping criticism focused on ideas, values, or behaviours, not on the performer, is strongly urged.

4.2 Effects and reactions

Individual traits and social norms must be considered to evaluate whether and how people are likely to respond to criticism [36]. The trait of personal assertion seems to be an important predictor for the type of response to criticism: non-assertive people

tend to agree with the criticism of their behaviour rather than to respond assertively to it.

As Piccinin *et al.* [38] observe, receiving criticism is associated with low self-esteem, feelings of inadequacy, stress, anger, failure, pain, and embarrassment. The idea of being criticized can prevent people from doing things, taking on challenges and stretching their minds or skills. It appears that criticism activates irrational beliefs and anxiety stemming from reduced self-esteem among individuals with a high fear of negative evaluation.

In fact, most individuals are sensitive to criticism, whether they have an underlying fear of negative evaluation or not. However, some people employ a more adaptive coping style that protects them from both devaluating themselves and alienating others by becoming hostile [40].

Graziano et al. [41] claim that people's collection of, and attention to criticism seems to follow a utility rule. Recipients of criticism will be more likely to attend to critical information when it is potentially useful for obtaining positive outcomes than when it is not potentially useful. However, this claim does not seem to take into account the strong emotional impact of criticism.

A number of studies caution against the destructive effects of negative criticism. As observed in many fields of psychology, providing continuous criticism (or excessive criticism) can be considerably damaging. Clinical research also reveals that negative feedback consistently lowers perceived credibility and impact of feedback. Continuous negative criticism affects negatively, among others, performance in the classroom (e.g., [42]), at work (e.g., [43]) or in sports (see [44]).

Baron [43] examines the impact of destructive criticism in work settings. His empirical studies show that negative feedback provided by managers is largely inimical to its major purpose, which is helping subordinates improve their performance. Both managers and employees view destructive criticism as a moderately important cause of conflict in their organizations. Destructive criticism can affect several important processes in work settings. It appears to produce negative effects on self-set goals and feelings of self-efficacy. Such shifts, in turn, may adversely affect performance on at least some tasks. Furthermore, exposure to destructive criticism seems to increase subjects' preference for relatively ineffective techniques of resolving conflict, while decreasing their preference for effective ones.

Baron shows that the negative impact of destructive criticism is often underestimated and that attempts to prevent the occurrence of destructive criticism prove to be more effective than relying on efforts to counter its negative impact. According to Baron [43, 45] originators of a critique who wish to make effective use of criticism (constructive criticism) when commenting unfavourably on the performance of their subordinates should be guided by the following principles: provide feedback that is specific, is delivered promptly, and is considerate in nature, rather than feedback that is general, is delivered only after a delay, and is not considerate in tone.

At the other end, constructive criticism, in its best sense, is a way to solicit and provide others with measures of success, with ways to improve on past or future performances, and with affirmation and support.

Petress [39] defines constructive criticism as helpful suggestions with socio-emotional implications. He suggests four possible purposes for constructive criticism:

- Offering receivers external views of their performance to compare with self-oriented views of their work;
- Helping the receiver recognize ways to improve past performances;
- Demonstrating to receivers that their efforts merit judgment as opposed to being ignored;
- Showing genuine interest and appreciation for a receiver's effort;
- Being encouraging, affirming, and supportive for the purpose of building confidence.

Abbott & Lyter [46] address the question of how criticism is best employed in social work field instruction and supervision, and how it affects learning. In the context of an empirical study, strategies for the effective and constructive use of criticism are outlined, including a composite of fourteen techniques for improving critical appraisal. These include holding the student accountable for performance expectations while offering time and support, showing professionalism and appreciation of the student, valuing open discussion of difficult topics, and reinforcement of effective performance.

According to the authors, positive effects of constructive criticism concern development of self (personal growth, insight, self-awareness, self-confidence, and character), correction of deficits and ineffective behaviours (learning from mistakes and turning deficits into strengths), promotion of learning, skill development, and encouragement of creative and innovative solutions. A destructive or harmful critique, on the contrary, does not have the goal of growth promotion. Its negative effects include damage to self-esteem and self-confidence, damage to motivation (along with discouragement of a desire to do social work), and impediment to learning and growth. The challenge facing the mentor or instructor is thus to provide feedback in a wise manner, that is, in a manner that discourages expectations and that minimizes risk of negative response [47].

4.3 Trust factor

For any type of critique to be optimally useful, receivers must play a complementary role. Too often, people reject an idea or strategy without entirely processing the information it contains. Such reluctance may be explained by different factors, one of which is the receiver’s perception of the critique source. To be effective, a critique

must be perceived as *legitimate* and the receiver must *trust* the critic, be it automated or human.

The key determinant of feedback acceptance that encompasses social factors is credibility. People are likely to trust a highly credible feedback source (see [48]).

Credibility is a perceived quality; it does not reside in an object, a person, or a piece of information. Although literature varies on the dimensions that may contribute to credibility, many identify expertise as a key component (especially in learning and performance situations). The expertise dimension of credibility captures the perceived knowledge and skill of the source and is referred to by terms such as ‘knowledgeable’, ‘experienced’, ‘competent’, and so on.

The relation between trust, feedback and performance can be seen in Earley’s empirical study. Earley [49] examines the usefulness of performance feedback in shaping American and English workers' behaviours. In the first study, an in-basket task was used to assess the importance of praise or criticism for work performance for 36 US and 36 English managerial trainees. A second study, using 86 US and 74 English workers, examined the relations among a worker's trust in a supervisor, perceived importance of praise and criticism, a worker's perceived amount of praise and criticism received, and performance.

Earley observes that workers do not universally accept verbal feedback. American workers responded favourably to both praise and criticism; those workers receiving a lot of feedback were productive. English workers responded to praise, but they did not respond as well to criticism. The phenomenon could be explained by difference in culture's collectivism (a value characteristic of a "we" vs. a "me" orientation) and power distance (workers expressing distrust of their supervisors or being less collectivistic toward their superiors).

The desire to respond to feedback is also a mediating variable in the impact of feedback on performance. The desire to respond is an attitudinal construct related to the importance that the individual accords to the feedback, anticipated outcomes as the result of responding, and social norms concerning a response.

Generally, results suggest that American and English subjects valued and responded to praise and criticism differently and that the influence of the feedback was partially mediated by a subject's trust in the feedback source and perceived importance of the feedback.

Earley concludes that the key determinant of feedback acceptance is an individual's trust in the feedback source. Viewing the provision of praise and criticism feedback as a one-way communication, this suggests that as trust in a supervisor decreases, so does the influence of feedback on a worker's behaviour. In addition, the closeness of a source is likely to be positively related to the trust an individual expresses in the source. In brief, a worker's supervisory trust mediates, in part, the influence of feedback on performance.

The closeness of the source seems indeed to be a determining factor. For example, it has been observed that responsiveness to criticism is different whether feedback comes from in-group or out-of-group members. Criticism from outsiders provokes high levels of defensiveness and suspicion. This resistance includes rejecting the veracity of the comments themselves (see, e.g., [50]).

Changes in trust may occur over time. While people's trust can increase with reliable and predictable behaviour, it may decrease as a result of some critical error or failure. Decreases in trust typically occur suddenly, but increases happen slowly and steadily. It is more difficult for individuals to regain trust after a failure than to develop an initial trust.

5. Critical scrutiny

Our information processing capabilities enable us to perform a wide range of cognitive activities and work in complex environments. As much as the human mind is impressive in its ability to learn and store immeasurable quantities of information, acquire new skills and perform complex tasks, its processing capacity is limited and prone to error. In such situations human cognition may benefit from argumentation and critical scrutiny, which can be initiated by the individual himself or by a partner in dialogue.

Critical thinking can be particularly useful in high-level cognitive tasks such as problem-solving and decision-making. As Hitchcock [5] observes, 'the practice of argument also has an important place in personal decisions about what to believe and what to do, since such decisions are likely to be wiser if reached on the basis of careful consideration of relevant arguments than if reached some other way'.

In the first part of this section, we provide a definition of critical thinking. Next, we discuss the use of critical thinking in decision-making contexts and illustrate the need for critiquing reasoning by indicating some of the limitations to human cognition. More specifically, we point at the cognitive biases that may affect individuals' decision performance and the particular vulnerabilities of expert and novice decision-makers. In the last part, through the description of critiquing systems, we show an application of critiquing as a way of reducing human errors in automated environments.

5.1 Critical thinking: Definition

The roots of critical thinking are as ancient as the vision of Socrates (known as "Socratic questioning"), who discovered by a method of probing questioning that people could not rationally justify their confident claims to knowledge. He then established the importance of asking deep questions that probe profoundly into thinking before we accept ideas as worthy of belief. He established the importance of seeking evidence, closely examining reasoning and assumptions, analyzing basic concepts, and tracing out implications not only of what is said but of what is done as well. In his mode of questioning, Socrates highlighted the need in thinking for clarity and logical consistency [51]. Many great thinkers from different disciplines extended this conception of critical thought later, e.g. Plato, Descartes and Kant, to name a few.

The contemporary critical thinking movement is studied from three different perspectives [52]: the normative category includes areas of philosophy such as epistemology, formal and informal logic, decision theory, or argumentation theory. The descriptive/explanatory category is related to psychological research, and addresses cognitive processes involved in problem solving, reasoning, or decision-making. The applied category includes education, training, educational psychology, human factors engineering, decision support and decision aiding. According to Cohen

et al. [52], even if these areas of research have been studied from different perspectives, there is one theory of critical thinking with normative, cognitive and applied roles.

Definitions of critical thinking developed by contemporary theorists abound. Freeley and Steinberg [53] define Critical Thinking as "the ability to analyze, criticize, and advocate ideas; to reason inductively and deductively[3]; and to reach factual or judgemental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief".

For Michael Scriven and Richard Paul [54] from the National Council for Excellence in Critical Thinking, critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual criteria and standards that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness. It entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question-at-issue, assumptions, concepts, empirical grounding; reasoning leading to conclusions, implications and consequences, objections from alternative viewpoints, and frame of reference.[4]

'Critical thinking, by its very nature, requires, for example, the systematic monitoring of thought; thinking, to be critical, must not be accepted at face value but must be analyzed and assessed for its clarity, accuracy, relevance, depth, breadth, and logicalness. Moreover, it requires, for example, the recognition that all reasoning occurs within points of view and frames of reference, that all reasoning proceeds from some goals and objectives, has an informational base, that all data when used in reasoning must be interpreted, that interpretation involves concepts, that concepts entail assumptions, and that all basic inferences in thought have implications'[51].

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[3] Induction is usually described as moving from the specific to the general, while deduction begins with the general and ends with the specific. Arguments based on experience, or observation, are best expressed inductively, while arguments based on laws, rules, or other widely accepted principles are best expressed deductively.

[4] Using Paul's work, Col. Guillot highlights some thinking skills that are particularly relevant in the military context. A military strategist must assess if his purpose is in line with goals and needs, look at situations from multiple points of view, change focus and shift his thinking to see things differently.

Guillot, W. Michael (2004) Critical Thinking for the Military Professional.
http://www.airpower.maxwell.af.mil/airchronicles/cc/guillot.html

See also:

ARI Workshop Proceedings: *Training Critical Thinking Skills for Battle Command*, 5-6 December 2000, Fort Leavenworth, Kansas, USA.

Critical Thinking requires appropriate cognitive skills [55]: interpretation, analysis, evaluation, inference, explanation, and self-regulation. **Interpretation** is to comprehend and express the meaning of a wide variety of experiences, data, situations, events, judgements, conventions, beliefs, rules, procedures, or criteria. **Analysis** is to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, intended to express belief, judgement, experiences, reasons, information, or opinions. It includes examining ideas, detecting arguments, and analyzing arguments as sub-skills of analysis. **Evaluation** is to assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgement, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, or questions. Some examples are: (1) judging if an argument's conclusion follows either with certainty or with a high level of confidence from its premises; (2) judging the logical strength of arguments based on hypothetical situations. **Inference** means to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences from data, statements, principles, evidence, judgements, beliefs, opinions, concepts, descriptions, questions, or other forms of representation. **Explanation** is to state the results of one's reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in terms of cogent arguments. Finally, critical thinkers can apply their powers to themselves and improve on their previous opinions. **Self-regulation** means to self-consciously monitor one's cognitive activities, the elements used in them, and the results educed, particularly by applying skills in analysis, and evaluation of one's own inferential judgements with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results.

These requirements are in accordance with the critiquing model we proposed earlier. Based on the analysis of the proponent's argument, the critic has to explain his interpretation of it by justifying the inferential relations that he has identified. This mechanism can apply to one's own or someone else's reasoning.

Moreover, critical thinking is a 'pervasive and self-rectifying human phenomenon. Critical thinking entails appropriate dispositions such as being inquisitive, systematic, analytical, open-minded, judicious, truth seeking, and confident in reasoning'[51]. We would add 'knowledgeable' to this list if critiquing occurs between two distinct individuals.

A variety of critical thinking strategies have been identified in studies of expert performance. Baron [56] identifies a general form of critical thinking strategy: (i) Propose a statement; (ii) think of a counterargument to the statement; and (iii) modify the statement so the criticism no longer applies.

Defined as asking questions about alternative possibilities in order to achieve an objective, critical thinking is described by [57] as a multi-layered structure, comprising mental models, critical dialogue, and control based on reliability [Figure 5]:

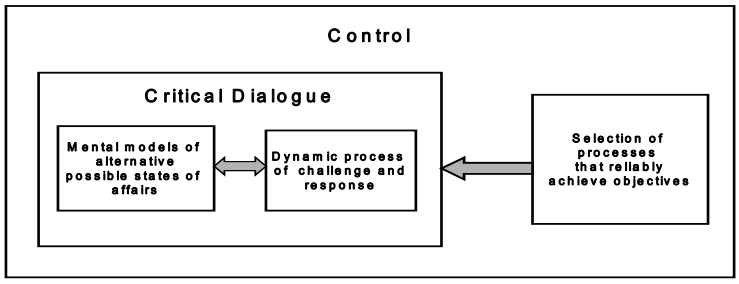

Figure 5. A model of critical thinking with three embedded layers

1. At its innermost core, critical thinking involves representation of alternative possible states of affairs, or mental models. Metrics of performance involve logical, probabilistic, and explanatory coherence of mental models. At this level, errors occur when cognizers overlook alternative possibilities or fail to properly assess the relative plausibility of different mental models, including their comprehensiveness and simplicity as explanations.

2. At the intermediate level, mental models are embedded within a layer of critical questioning which motivates the generation and evaluation of possibilities. Critical questioning may take place within a single mind or among different individuals as a critical dialogue. Critical questioning is evaluated by reference to norms for conducting the appropriate kinds of critical dialogue. Dialogue types are differentiated by the purposes they serve, by the types of challenges that are permitted to the opponent, and the scope of the permitted responses by the proponent. At this level of analysis, errors occur when cognizers fail to ask or answer questions associated with the appropriate argumentation scheme, use argumentation schemes that obstruct the purpose of the dialogue, or inappropriately shift from one dialogue type to another.

3. At the outermost layer, critical thinking is a judgment about the reliability of a cognitive process or faculty, hence, the degree of trust that should be placed in its outputs. A critical dialogue is only one of various cognitive or social processes that might be utilized alone or in combination to generate beliefs and decisions. Non-deliberative processes, such as pattern recognition, may be more reliable under some conditions and can almost always be used to verify the results of reasoning - just as reasoning is used to check the results of intuition. At this level, errors occur when cognizers use inappropriate or inefficient strategies, and when they terminate a process too soon or continue it too long.

In sum, for these authors, critical thinking skill is exemplified by asking and answering critical questions about alternative possible states of affairs, with the intent of achieving the purpose of an on-going activity.

5.2 Decision-making and Critical thinking

How can critical thinking be beneficial for decision-making?

Decision-making can be defined as the process of thought and action that culminates in some type of choice. Johnson-Laird & Byrne [58] suggest that decision-making consists of activities such as 'formulate plans, evaluate alternative actions, determine consequences of assumptions and hypotheses, interpret and formulate instructions, rules and general principles, weigh evidence, decide between competing theories and solve problems'.

The normative approach to decision-making suggests that the decision-maker determines all the potentially favourable and unfavourable consequences of all the feasible courses of action. To do so, the decision-maker must know the objective probabilities involved. In fact, effective decision-making requires access to an appreciable quantity of information, the quality of which varies along three dimensions: reliability, availability and relevance [59].

However, in practice, the required information is not always available or cannot be processed in a timely manner. In attempts to obtain the degree of knowledge needed to anticipate alternative outcomes, the decision-maker is likely to be overwhelmed by 'information inundation', which can be quite as incapacitating as the lack of information. Ill-structured problems, uncertainty, shifting goals, action/feedback loops, time stress, high stakes and multiple players are other factors that may affect decision-making performance [60]. Because of all these difficulties, people rarely adopt a normative decision-making approach because either the information they need cannot be obtained or the situation requires them to process so much information that impossible demands would be placed on their resources and mental capabilities.

In his work on rational decision-making, Simon [61] considered that optimal decision-making is impractical in complex problems. He characterized different types of decision situations that require different problem-solving techniques, i.e. non-complex optimization problems, complex but well-specified decision problems, and complex and ill-specified decision problems. For the latter category, such as the choice of a course of action among alternatives, he discussed the concept of bounded rationality, i.e. the failures of knowing all the alternatives, uncertainty about relevant exogenous events and inability to calculate consequences. Two concepts are central to this approach: a theory of search, and a satisficing theory (search until a satisfactory alternative is found according to criteria).

In complex decision-making contexts, it is probable that decision-makers will search for a course of action that is "good enough" or meets a minimal set of requirements. To this end, individuals employ subjective probabilities based on their degree of belief in the possible outcomes and resort to the use of "rules of thumb" or heuristics, which can be viewed as mental shortcuts adopted by humans to cope with complex environments.

Heuristics allow humans to quickly process huge amounts of information in complex contexts, and often arrive at reasonable decisions under difficult circumstances. Using heuristics implies a schema-driven reasoning [62] where the individuals use their prior knowledge and experience in the decision episode domain to make inferences about a situation and decide what information is valuable for the solution. This 'enables speedy assessment, search, selection and interpretation' [60] and can be an advantage when the decision-maker is faced with information overload.

However, such reasoning, where perceived information fits into an existing schema, may be prone to many judgement biases. Also, by using heuristics, the decision-maker can disregard large proportions of data without thought, which in specific instances may represent a serious source of error.

In the following, we show the usefulness of critical thinking first by showing the particularities of expert and novice decision-makers and then by giving examples of frequent errors and biases in decision-making contexts.

5.2.1 Experts and novices

It is important to understand how people use their knowledge and experience in coping with decision tasks. Individuals may know a lot about the problem domain and can be classified as experts. However, this does not mean they are expert decision-makers, but that they are familiar with the tools and information sources relevant to making a decision in a specified area.

Researchers studying problem-solving issues have found fundamental differences between novices and experts [60]. Evidence has suggested that experts and novices are able to use similar memory storage and retrieval capacities. From this stance, the sheer extent of knowledge entailed in expertise might seem an impediment to quick reasoning in decision-making. However, in expert performance, the large domain specific knowledge base is used in a skilled manner that reduces the role of a memory search and general cognitive processing, which can be time-consuming.

As a matter of fact, when experts gain competence, elements of knowledge become interlocked so that the individual will store coherent chunks of information in his memory. As experience strengthens, newer elements are linked to stored structures so that the expert can rapidly retrieve meaningful patterns for working through decision problems.

Expertise can help a person to seek relevant information that will be helpful in coping in a situation, and to generate sets of plausible diagnoses, options, or hypotheses, rather than wasting time on irrelevant information. Thus, the major factor that distinguishes the experienced from the novice is the former's situation assessment, not his reasoning per se.

Skilled performers rely heavily on heuristic strategies to manage time pressure, complexity and uncertainty [63]. These rules are triggered by the

recognition of surface features of a decision episode. The use of these strategies is not systematic for novices. Although they may know that a principle/strategy exists, they may not be so readily able to apply it as experts are, as they need to make conscious inference that the strategy can be used, whereas experts will not need to cogitate on this and will just apply it. Consequently, while a critic can help a novice decision-maker consider options she did not know about, he/she would remind the expert not to overlook data that are not integrated into his schema of the decision situation.

Experts use recognition-primed or perception-based decision processes to retrieve a single probable option, whereas novices are more likely to adopt an analytical approach where they systematically compare multiple options, some of which are not relevant [64]. Training can be helpful in teaching novices how experts use their knowledge to establish organized structures such as schemata for reference. Experts, on the other hand, could benefit from critical thinking at its outmost layer, as described above.

Skills in situation assessment do not necessarily entail performance in decision-making. Recent studies have questioned experts' abilities in non-repeated decision tasks. These works have revealed that experience improves decision-making only for well-practised or anticipated tasks with established procedures while on the other hand, in unique or unanticipated tasks, experience may actually contribute to poorer decision-making. Explanations for this poor decision performance of experts are the rigidity and abstraction of the expert's mental models and his/her complacency and overconfidence. Critical reasoning can challenge these well-established mental models by drawing the decision-maker's attention on alternative possibilities.

In novel situations where no familiar pattern fits, proficient decision-makers may supplement recognition with processes that verify their results and correct problems. Cohen et al. [65] developed a naturalistic model of Critical Thinking called the Recognition/Metacognition model that describes a set of critical thinking strategies to supplement recognitional processes.

The authors propose the STEP prescriptive procedure (Construct a Story, Test, Evaluate and Plan) for critical thinking in decision-making applied for tactical military decision-making that contains formal elements of critiquing. The steps to be followed are:

- Create a story (a structured situation model), filling gaps regarding what must have already happened and what may happen next, if the initial assessment is true.

- Test for conflict, trying to explain all observed events in terms of the story, even if at first they do not seem to fit.

- Evaluate the story, asking if the story makes sense; at that point one may abandon the story and repeat the first step.

Metarecognitional processes determine when it is worthwhile to think more about a problem. Processes first identify evidence-conclusion relationships (or arguments) within a situation model or plan (story). Then, they critique the story for *incompleteness*, *conflict*, and *reliability* by identifying problems in the arguments that support a conclusion within the situation model or plan. An argument is *incomplete* if it does not provide support either for or against a conclusion of interest (questioning example: in predicting enemy plans, have I considered all the factors that might influence the enemy intent?). Two arguments *conflict* with one another if they provide support both for and against a conclusion, respectively (question: if I use artillery fire to reduce an enemy's strength prior to an attack, do I sacrifice the element of surprise?). An argument is *unreliable* if it provides support for, but not against, a conclusion, but the support depends on unexamined assumptions (question: do my predictions about enemy action or my plans depend on covert assumptions, for example about enemy capabilities, the weather, or the passability of terrain?). Finally, processes attempt to make corrections that respond to these problems, by collecting or retrieving new information and revising assumptions. Metarecognitional processing occurs when the benefits associated with critical thinking outweigh the costs. Critiquing and correcting in terms of arguments is a more general skill than critiquing and correcting in terms of domain-specific mental models. It can take more time and may be less effective than the corresponding specialized skill. However, in unfamiliar domains or novel situations, it may be the only available approach to resolving uncertainty.

5.2.2 Reasoning biases

As discussed above, heuristic judgment may be made for reasons of time, habit, stress, or perceived efficiency. The systematic use of these heuristics can give rise to errors of judgment, known as biases [66]. Critical reasoning can be very useful for identifying and correcting such biases.

In [67], Silverman reviews four taxonomies of causes of errors in effective decision-making. The first taxonomy consists of cognitive biases, which are tendencies the practitioner is likely to repeat. They are judgment heuristics (rules of thumb) that humans routinely use to replace formal logic and reasoning in order to save time and reduce complexity. For example, problem solvers and planners are likely to be overconfident in evaluating the correctness of their knowledge. They will tend to justify their chosen course of action by focusing on evidence that favours it and by disregarding contradictory signs (overconfidence bias). The second taxonomy of causes was popularized by Norman and Reason [63] as accidents, which are attentional slips or memory lapses. Unlike cognitive biases, accidents tend to be non-repetitive. The third taxonomy, like cognitive biases, tends to be repetitive; however, they may or may not be subconscious. Specifically, cultural motivations tend to be goals and values that a practitioner picks up

from his organization or environment, and internalizes into his mental model of task. The fourth taxonomy is missing knowledge.

The type of error targeted by the critiquing systems literature and discussed here are cognitive biases. Bias in reasoning arises when people consistently use inappropriate heuristics that lead to an incorrect task outcome. Such reasoning biases are independent of individuals' knowledge level or experience. In fact, experimental evidence does not strongly support the conclusion that expertise reduces the magnitude of biases, the dependence on heuristics or the overall quality of decision-making [68].

Some of these reasoning biases are listed below:

- *Hindsight bias:* This involves claiming, after the fact, to have known more than one did. There appears to be no reduction in hindsight bias after complete information is given and after repeated testing. These findings support automatic processes as explanation for the observed bias and dismiss motivational accounts [69]. Of importance to decision-makers who use assessments of the past to make future plans is how individuals show the bias when their decisions reflect upon their ability or skill [70].

- *Confirmatory bias:* Describes the decision-maker's tendency to seek new information that supports the currently held hypothesis and to ignore information that conflicts with this hypothesis. Human beings have a fundamental tendency to seek information consistent with their current beliefs, theories or hypotheses and to avoid the collation of potentially falsifying evidence [71].

- *Availability bias:* Refers to the ease with which seemingly relevant information is remembered. People employ a limited number of heuristics to simplify complex questions involving probabilities or frequency of occurrence. The availability heuristic is usually helpful to decision-makers because those things most easily remembered generally do follow a pattern of appearing most frequently in nature. However, this is not always the case because some of the things we most vividly recall are remembered for some other characteristic which makes them particularly salient in memory but has nothing to do with their frequency of occurrence. This implies that the particular hypothesis a decision-maker chooses to base his or her actions on is dependent upon which hypothesis is most available in memory and not which may be the most likely in the circumstances (see [72]).

- *Probability bias:* A false belief persists that people can perceive randomness or accurately judge probabilities of multistage problems. In reality there is frequently a failure to appreciate that events are independent of each other. This common bias is referred to as the probability bias. People tend to ignore less likely uncertainties and base

judgments only on most likely uncertainties when confronted with multistage problems. The result is a consistent bias that overstates the probability of the outcome as compared with the statistically computed probabilities (for example, see [73]).

- *Salience bias*: When assimilating multiple sources of information to formulate a hypothesis, the salience bias refers to the decision-maker's inclination to concentrate on the most salient (most noticeable) cue, as opposed to that which may be most informative.

- *Framing:* Refers to the way in which a given decision problem can be characterized or described. Decision-makers exhibit framing bias when their preference between decision alternatives changes as a function of whether a given decision problem is framed in terms of gains or losses. Framing can take place at many levels in the decision-making process. Positive and negative framing can systematically influence the outcome of decision episodes. Framing affects the perception of information and may act as a catalyst for different modes of cognitive processing. Negative framing induced controlled processing whilst positive framing was associated with a more automatic cognitive mode. Framing could influence the overall perception of the decision episode (for example, see [74]).

In the Intelligence Analysis domain, Heuer [75] describes pertinent cognitive biases that affect the evaluation of evidence, the perception of cause and effect, the estimation of probabilities and retrospective evaluation of intelligence reports.

Through the use of critiquing systems, Silverman [76] has mainly attempted to counter confirmation biases. Indeed, even when instructed to be objective, people tend to seek and select information in ways that confirm (rather than disconfirm) their initial beliefs. Numerous experiments show that people fail to discover general rules when required to actively seek relevant evidence because they adopt strategies intended to confirm, not rebut, their hypotheses. Baron [43] argues that the confirmation bias is one of the central obstacles to the improvement of rational behaviour in humans.

Cohen claims that the traditional view of the confirmation bias either paralyses decision-makers or forces them to settle for an unrealizable statistical average of the possibilities. He suggests that experienced decision-makers try to make sense of conflicting data by constructing coherent stories, i.e., by revising and improving their mental models through an iterative process of critiquing and correcting.

Given that in general, reasoning biases are often motivated by personal goals or deep-rooted beliefs, critical reasoning may be more efficient when carried out by a second party rather than by oneself (self-criticism). Klaczynski *et al.* [77] claim that in order to perform effective critical thinking, individuals must

(i) possess the rudimentary competencies to perform specific cognitive operations; and (ii) conquer the meta-cognitive challenge of evaluating evidence independently from their goals and beliefs.

The results of their study show that when presented information pertinent to their personal goals or theories, individuals apply a wide range of reasoning tactics to preserve the integrity of these goals and beliefs. Consequently, most individuals are not objective information processors. The availability of both heuristics and critical reasoning principles allows people to use sophisticated strategies when such strategies suit their purposes. Alternatively, people use less sophisticated heuristics when these strategies enable them to preserve their goals and beliefs. When presented belief-enhancing information, individuals process this information at a relatively shallow level, without engaging in extensive critical scrutiny, and readily assimilate it to their existing belief systems. By contrast, belief-threatening information cannot be readily assimilated to individuals' belief systems. Individuals engage in more extensive data analysis and process it more deeply. This deeper processing, in turn, activates sophisticated strategies that can be used to effectively refute the data.

Individual differences in intelligence yield little information regarding the ability to reason independently from one's personal goals. So, it seems that critical thinking competence is largely independent of the abilities assessed by intelligence tests. However, individuals who indicated that they were rational processors were better able to reason beyond the boundaries set by their pre-existing theories and beliefs and processed goal-relevant information more objectively than intuitively oriented persons.

5.3 Critiquing systems

The artificial intelligence community uses the term '*critiquing system*' to designate computer programs that critically examine problem solutions that were generated by a human user. The process involves the use of some form of support software through which a problem and a trial solution are represented. A module of the software then examines the user's solution and provides feedback that encourages improvement of the solution. This process can be repeated a number of times until a satisfactory solution is found.

Silverman & Mehzer [78] define Expert Critiquing Systems (ECS) as a class of programs that receive the statement of the problem and the user-proposed solution as input, and produce as output a critique of the user's judgment and knowledge in terms of what the program thinks is wrong with the user-proposed solution.

Critiquing systems stand out from traditional expert systems since, instead of delivering the solution to the user, they provide a critique of the user-proposed solution, possibly with supporting explanation and argumentation. Some systems can compare their own solution with that of the user and provide *differential critiquing;*

however, as Robbins [79] and Gupta et al. [80] point out, a large number of ECS simply provide *analytical critiquing* which checks an artefact with respect to predefined features along some standard or guidelines. These ECS will produce a solution which will respect constraints and heuristic rules.

One of the objectives of providing critic feedback is to prevent or correct erroneous decision-making due to poor heuristics or cognitive biases. But ECS can also look for errors due to lack or misuse of knowledge. As Mezher et al. [81] put it: 'There are two major uses of expert critiquing systems: (1) in the realm of knowledge, critics inform the user with knowledge and constraints or criticize the knowledge the user has offered; (2) in the realm of judgment, they critique the user's reasoning, judgment and decision processes'.

According to Silverman and Mezher [78], expert critiquing systems can be used to help managers in different ways when using decision support environment. First, critics compare the current decision to a store of common erroneous decisions. Second, critics check the current decision for violation of good decision rules, cues and constraints that managers tend to overlook or misuse. Finally, critics provide feedback and situated tutoring on specialties missing from typical managers' training.

Silverman [66] discusses three types of critics that can intervene at different stages: *Influencers* warn experts about nonregressive and overconfidence biases and explain how to avoid them. *Debiasers* notice that an erroneous judgment remains and steer users toward a more correct reasoning strategy. Finally, a formal reasoning *director* is triggered if users retain their nonregressive answer. The director requires the user to gather data, conduct the steps of a regressive analysis, and compute the correct answer.

The critic's strategy may be a positive appeal, a negative condemnation, or procedural; and the strategy type may involve querying, hinting, suggesting defaults or analogs, repetition, persuasion, repair, and others.

A general critiquing process model can be found in Robbins [79], who develops a five-stage critiquing method called ADAIR. Here is a summary of the method as applied to design tasks:

- *Activate*. In the first phase, an appropriate subset of all available critics is selected. Only those critics that are timely and relevant to the current design issue - as explicitly specified by the designer or as inferred from the state of design and/or user models - are activated.

- *Detect.* Second, active critics detect assistance opportunities and generate advice. The most common type of assistance opportunity is the identification of a syntactic or simple semantic error.

- *Advise.* Third, design feedback items are presented to advise the designer of the problem and possible improvements. This phase is central to the concept of supporting the designer's decision-making; the presence of this phase differentiates critiquing systems from automated problem solving systems. Much

of the potential benefit of critiquing is associated with this phase: the feedback item improves the designer's understanding of the status of the design, the explanation provided improves the designer's knowledge of the domain, and the designer is directed to fix problems. This ultimately results in more knowledgeable designers and better designs that have fewer errors and better conformance to stylistic conventions.

- *Improve.* Fourth, if the designer agrees that a change is prudent, he or she makes changes to improve the design and resolve identified problems. Fixing the identified error is likely to be one of the most frequent forms of improvement. Other types of improvement clarify the fact that the feedback is irrelevant rather than directly change the offending design elements. For example, the designer might change the goals of the design in reaction to an improved understanding of the problem or solution domain, or a change might be made to some aspect of the design that is outside the representation used by the design tool.

- *Record.* In the final phase, the resolution of each feedback item is recorded so that it may be used for future decision-making. Having a record of problem resolutions is important later in design because each design decision interacts with others. Often a design change that fixes one problem causes another problem. When a new problem is identified designers often need to know why the problem arose, or they risk reintroducing problems that had previously been resolved. Critics help elicit design rationale as part of the normal design process by acting as foils that give designers a reason to explain their decisions. Furthermore, recording the outcomes of criticism and collecting metrics on the impact of individual critics is key to effective maintenance of critiquing systems.

Creating a compendium of decisions, rationales and critiquing feedback is an important role of any operational critiquing system (and a basis for ensuring its continuing improvement). Presenting this compendium in a readily-usable form such as 'lessons learned knowledge warehouse (LLKW)' is invaluable, not to just aid in a specific future decision, but also for its potential to improve future decision-making process in general.

As for the other stages discussed above, Gupta et al. [80] suggest that for situations where the design solution can be critiqued from various domain perspectives, it is worthwhile to use multi-domain independent critiquing systems each relying on a dedicated knowledge base. In its simplest form, the critiquing system must integrate two essential process phases, the detect process for problem identification and the advise process which communicates the issue to the user. Multiple instances of these processes can interact with the user concurrently as long as problems are detected. ECS can also use *positive* and *negative* critique as well as argumentation as means for more informative decision support [82].

Clearly critiquing systems, like other dialogue devices such as explanation or argumentation systems, call upon both knowledge of the domain and knowledge on communicative behaviours. Shepherd et al. [83] distinguish these as domain

knowledge and critiquing knowledge. Critiquing knowledge focuses on methodology used to present feedback information to the user operating the system.

Fischer et al. [84] consider *knowledge about the communication process* and *knowledge about the communication partner* as being equally important to good user performance as domain knowledge. Finally, knowledge about instructional strategies should also be considered if critiquing is to be enhanced with coaching and tutoring abilities.

Many of these features and requirements reflect the essential aspects of critiquing in the human-human environment. The critiquing process as a means of enhancing the user's product, and the use of knowledge about the user for improving support, reflect the dialectical nature of argumentative/critical discussions, while debiasing and guidance are akin to certain aspects of critical reasoning. The use of positive and negative criticism, although inspired from psychology literature on criticism, does not quite come close to the human-human setting, since in human-system context, criticism implies no emotional impact. Trust, on the other hand, is as important for the human-human context as for the human-system environment. Effective cooperation requires that the individual have trust in the advice and information given by the system, yet, the human's trust depends on the system's performance and transparency. Failure to gain trust is liable to result in a situation where teamwork will break down due to a judgment of machine-generated information as being unreliable and hence untrustworthy. This will result in either the user ignoring the information or seeking to verify it. Either of these outcomes is liable to produce sub-optimal teamwork.

Too much trust in an inaccurate system can also produce sub-optimal effects. Over-trusting an inaccurate system or one that ceases to function interferes with the task and produces lower performance than no system at all.

6. Conclusion

This document provided a complete account of critiquing across several disciplines such as informal logic, argumentation, critical thinking, cognitive and developmental psychology, communication theory, etc.

Within the framework of argument studies, we defined a critique as a meta-argument which analyzes another argument with respect to the position it supports. Contrary to other arguments, the argumentation line of a critique does not ensue from the opinion of the arguer (critic) with regard to a given reality, but rather by the argument structure of the product being analyzed. Consequently, the critic has a double ambition of persuasion: first, he has to convince the audience of the position he is critiquing by showing evidence of supporting elements in the proponent's argumentation, next, he has to show why this position is significant or problematic.

We saw that the analytic approach used in critiques, and also the dialectical nature of critiquing differentiates this concept from evaluation and criticism, which seem to intervene respectively at the level of the argument/product and its source only. Throughout this document, we supported the hypothesis that a critique, contrary to an evaluation, targets the opinion that is argued for, and that it is for this reason that it questions the reasoning and the moral person beneath the argument.

We accounted for critiquing as an interactive process which can be analyzed in terms of constitutive stages, strategies of argumentation, participants' roles (proponent, opponent, etc.) and purpose of dialogue. The characterization of argumentative and critical discussions allowed us to show the goal-directed and audience-tailored character of this type of communicational exchange. To reach his goal, the arguer has to take into account his/her opponent's values and opinions, in addition to facts. Argumentation is therefore not only a series of reasons given for strengthening a claim, but an exchange appealing to subjective issues that are defined by and within the conversation context.

We saw that it is the dynamics of the dialogue as a prototypical discourse and not the purpose of the individuals engaged in that dialogue that characterizes a critical discussion. In general, the receiver must rely on a lot of contextual information to interpret the intention of the speaker. This is all the more true for critiquing since a critic does not construct his/her discourse on his/her own position, but on issues pertaining to the receiver's position. Furthermore, critiquing is a type of discourse whose objective varies significantly from one context to another. When critiquing a final product, the reviewer does not intend to help its author/creator to improve it, whereas this is all an automated critic is supposed to do for a user in a human-system environment.

Context also plays a major role in critique/criticism acceptance. Critiquing in a working environment is not as welcome as critiquing in a learning context. As we saw,

factors such as trust, perception of credibility, but also socio-cultural factors can play an important role in critique/criticism interpretation.

A critique must be characterized with regard to the context in which it occurs and the type of argument it applies to. We based our analysis of critiquing on an extended concept of argument. Naturally, the purpose, the structure and the scope of the argument under consideration will have an incidence on the critique that examines it. Critiquing is determined by its object and the knowledge domain in which it operates, but also by a whole range of subjective factors. As Nowlan [21] observes: 'Different kinds of criticism come from different perspectives (or vantage points), proceed in different directions, advance different ends, and support different interests, and they can be classified, compared, and contrasted, and criticized in turn according to differences along these lines (perspective, direction, end, and interest), as well as along many others.'

Critiquing was also analyzed as a practice by which one or more individuals can articulate their thought, change their mental models, correct their reasoning biases, and justify their reasoning. Globally, critical thinking is the ability to think about one's thinking in such a way as to recognize its strengths and weaknesses and, as a result, to recast the thinking in an improved form. Although we did not elaborate on this subject in this report, training critical thinking skills is an essential skill for strategic leaders and has recently gained importance in the military domain, in particular for training military decision-makers dealing with complex and knowledge-intensive tasks.

One point we did not discuss here is the role of critiquing in shaping new opinions. As Breton [1] writes, argumentation is made of representations of the world that we share with all other human beings, metaphors in which we live and which structure our vision of things and beings. These mental worlds are in fact created by argumentation and it is argumentation that changes them. Argumentation is their main dynamics, the machinery that shapes the raw material of beliefs, opinions and values. Critiquing, in this framework, can be viewed as a filter through which the public can better decode the opinions and representations underlying this flow of arguments.

* * *

For the application of the critiquing practice to military decision-aid systems, three points stand out. First, to ensure that decisions, rationales and critiques are not ephemeral, they must be recorded in a compendium for any operational decision-aid system (DAS). This compendium provides the basis for after-action analysis to understand the decisions that were made and potentially improve upon the critiquing provided by the DAS. Second, the transformation of key insights obtained from the analysis of the compendium into a readily-usable form such as a lessons learned knowledge warehouse (LLKW) is invaluable. The LLKW has the potential to, not just provide aid for a specific future decision, but to result in improvements in the decision-making process in general. The third point regards the trust factor. Any DAS must help and not hinder the decision-maker. Building up trust in a DAS' capabilities

is an ongoing process, and any DAS critique based on faulty rationales will result in a loss of credibility for the DAS. It is more difficult for a DAS to regain trust after a failure than to develop an initial trust.

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As part of the Technology Investment Fund Project entitled CoA Critiquing System for the Improvement of the Military Estimate Process, this report aims at providing insight into the critiquing problem from a human factors perspective.

Drawing on studies from the fields of philosophy (logic and argumentation), linguistics, psychology and sociology, critiquing is studied in this document along three dimensions: (i) as an argument; (ii) as an interpersonal and social practice; and (iii) as a mental process. As an argument, critiquing is analyzed as both a premise-conclusion structure and a dialectic exchange. Critiquing and critical discussion are studied with respect to principles and models of argument and argumentation. Next, critiquing as an exchange between intentional individuals is viewed from the perspective of the critic and the receiver. Attitudes that can affect the perception and the effectiveness of criticism are discussed in the light of psychological and socio-cultural factors. Finally, under the topic of critical scrutiny, the dynamics of critiquing as a mental process are rendered explicit through the description of the concept of critical thinking and its use in decision-making contexts where it targets reasoning biases. A description of critiquing systems illustrates the critical mechanism as applied to the human-computer setting.

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